



Apple Service  
Technical Procedures  
Volume Two



# **TECHNICAL PROCEDURES VOLUME TWO**

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# Apple Technical Procedures

## Volume Two

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## o FERRITE BEAD INSTALLATION

The new analog board for the Macintosh® SE can cause EMI interference. To reduce EMI interference, a clip-on ferrite bead and tie-wrap (packaged with the analog board) must be installed on the video board cable of your Macintosh SE (see Figure 1 below). Refer to the Take-Apart section of your Apple Technical Procedures for additional information.

### Materials Required

Jeweler's screwdriver  
Clip-on ferrite bead  
Plastic tie-wrap

---

**WARNING:** Make sure the CRT has been discharged before performing the following procedure.

---

### Procedure

1. Perform these steps only if a ferrite bead is not already installed on the video board cable in your Macintosh SE as shown in Figure 1.
2. Using a jeweler's screwdriver, pry up two plastic latches and open the clip-on ferrite bead.
3. Position the clip-on ferrite bead (Figure 23, #1) around the video board cable as near the connector (Figure 23, #2) as possible, and snap the bead shut.
4. Install a plastic tie-wrap (Figure 23, #3) to hold the ferrite bead near the connector. Cut off excess tie-wrap.

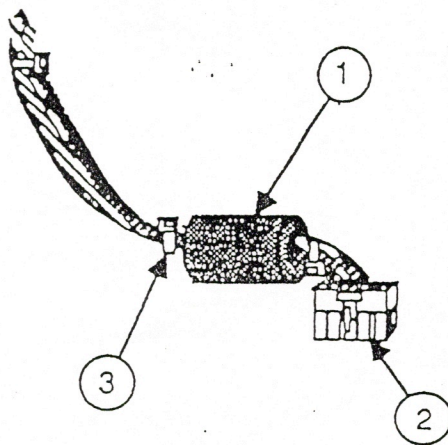


FIGURE 1









**WARNING :** For information on discharging the CRT and checking power supply voltages, refer to the "Macintosh Technical Procedures".



**CAUTION: TO PREVENT DAMAGE WHEN YOU DISCHARGE THE CRT,**

- Use the CRT discharge tool (when available).
- Discharge the CRT anode to the ground lug.
- Never discharge to the chassis.

When you replace a logic board or power supply module :

- Adjust the voltage levels within specifications.



**ATTENTION : POUR EVITER D'ENDOMMAGER LES CIRCUITS LORS DE LA DECHARGE DU TUBE A RAYONS CATHODIQUES (TRC) PROCEDER DE LA FAÇON SUIVANTE :**



- Utiliser l'outil prévu à cet effet.
- Décharger l'anode du TRC par la cosse de masse du tube.
- Ne jamais décharger le TRC directement par le chassis.

Lors du remontage de la carte logique ou de la carte d'alimentation :

- Régler les tensions aux valeurs indiquées dans la documentation: "Procédures Techniques Macintosh".



**ACHTUNG - WICHTIG ! VERMEIDEN SIE BESCHÄDIGUNGEN BEIM ENTLADEN DER BILDRÖHRE,**

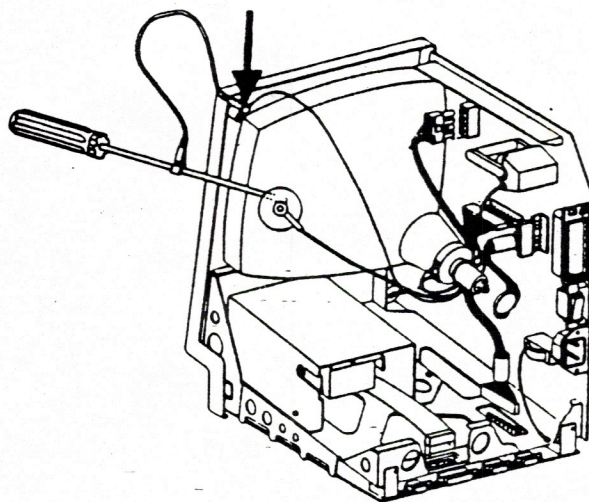


- Entladen Sie die Bildröhre mit dem Spezialwerkzeug.
- Entladen Sie die Bildröhre an der Erdungsschraube.
- Nicht am Gehäuse entladen !

Beachten Sie bitte folgendes beim Austausch der Analog - oder Logicplatine :

- Justieren Sie die Spannungen entsprechend den Spezifikationen !

Bitte beachten Sie unbedingt die Angaben in den "Macintosh Technischen Verfahren".



## Apple Macintosh



**ATTENZIONE : PER EVITARE DANNEGGIAMENTI MENTRE VIENE SCARICATO IL CRT,**



- Usare l'attrezzo apposito (quando disponibile).
- Scaricare l'anodo del CRT sulla presa di massa (CRT).
- Non scaricarlo mai sullo chassis.

Quando viene sostituito l'alimentatore o la scheda logica :

- Regolare i voltaggi secondo le specifiche.

Per maggiori informazioni fare riferimento alle "Procedure Tecniche di Macintosh".



**IMPORTANTE: PARA EVITAR DAÑOS AL DESCARGAR EL TUBO DE IMAGEN,**



- Use la herramienta adecuada (CRT discharge tool).
- Descargue el ánodo del tubo a la toma de tierra del tubo.
- Nunca descargue el ánodo del tubo directamente al chasis.

Quando reemplaza una placa de circuitos o una fuente de alimentación :

- Ajuste las tensiones a los niveles que señalan las especificaciones.

Para mas informacion sobre descarga del tubo y ajuste de las tensiones, ver "Procedimientos Técnicos del Macintosh".



**VARNING : FÖR ATT UNDVIKA SKADOR I SAMBAND MED URLADDNING AV BILDRÖRETS ANOD,**



- Använd endast det speciella urladdning sverktöget (CRT discharge tool).
- Ladda alltid ur bildrörets anod mot bildrörets jordpunkt.
- Ladda aldrig ur bildrörets anod mot någon av metalldelarna i chassit.

Om du byter logikkort eller nätdel :

- Kontrollera och justera spänningarna så att de ligger inom specifikationerna.

För ytterligare information om urladdning av bildrörets anod eller kontroll och justering av spänningarna hänvisas till "Macintosh Service Manual/Technical Procedures".







# SILENTYPE PRINTER TECHNICAL PROCEDURES

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# Silentype Technical Procedures

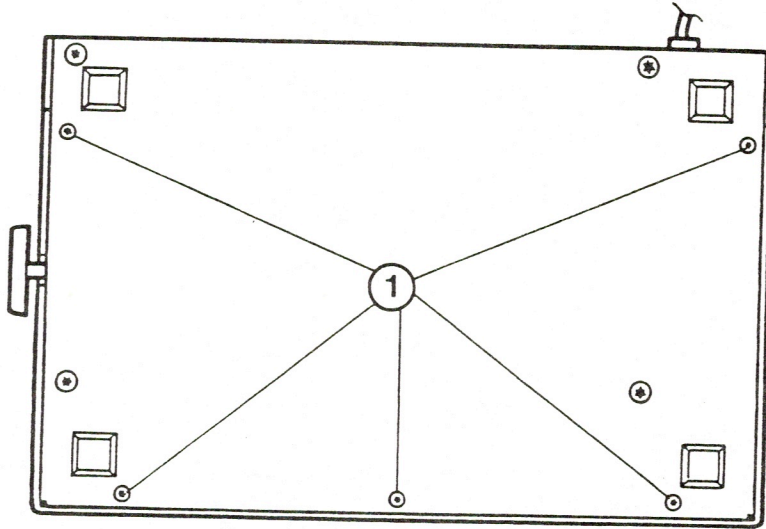
## Section 1

### Take-Apart

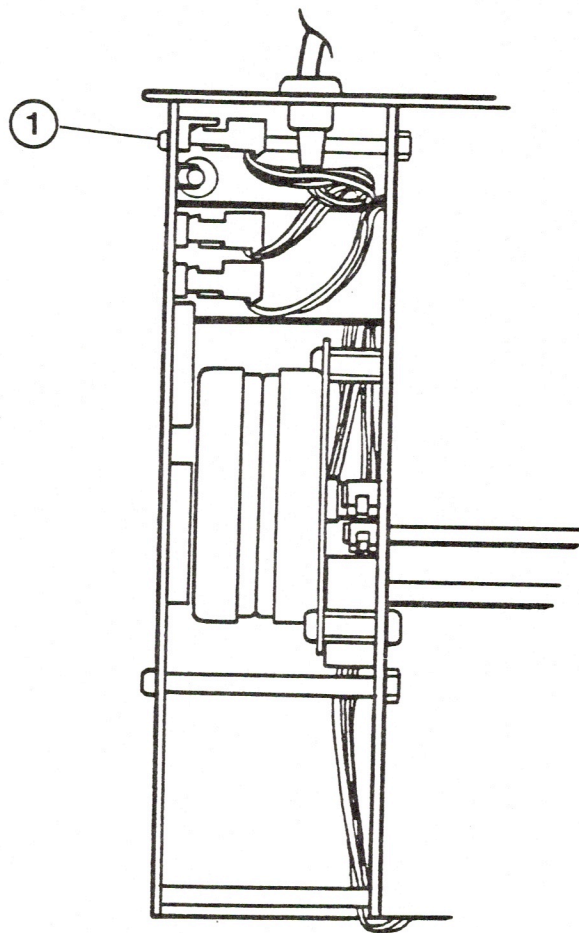
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**FIGURE 1**



**FIGURE 2**



## A. REMOVING THE COVER AND BASE

### Removing the Cover

1. Turn the Apple off.
2. Disconnect the printer from the interface card.
3. Tip the unit up on its back.

**NOTE:** Do not turn the Silentype completely over. The paper roll is held in by gravity.

4. Using a Torx screwdriver, remove the five screws around the outside of the base which hold the plastic cover on (see Figure 1).
5. Remove the cover.

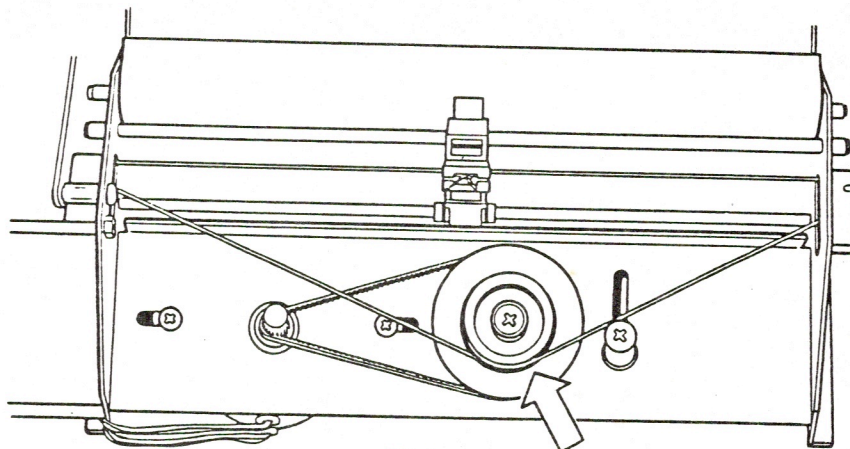
### Removing the Base

6. While holding the chassis to the base, remove the remaining four screws.

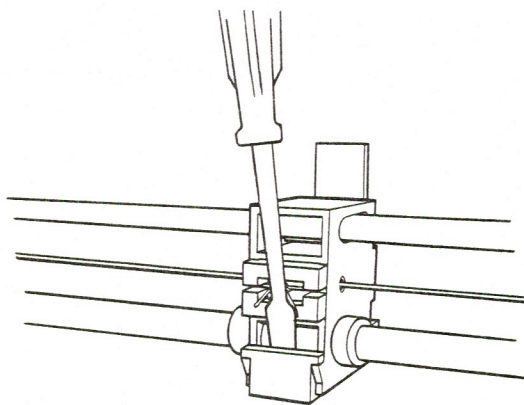
**NOTE:** In general, it is a good idea to remove all nine screws every time you begin to service a Silentype, since you will nearly always have to get underneath the assembly.

7. Tip the unit back down. At the left of the unit is a printed circuit board (the deserializer card). Locate the three cables connected to it, and disconnect the rearmost cable (interface cable) from connector J3 (see Figure 2, #1). The chassis can now be lifted from the base.

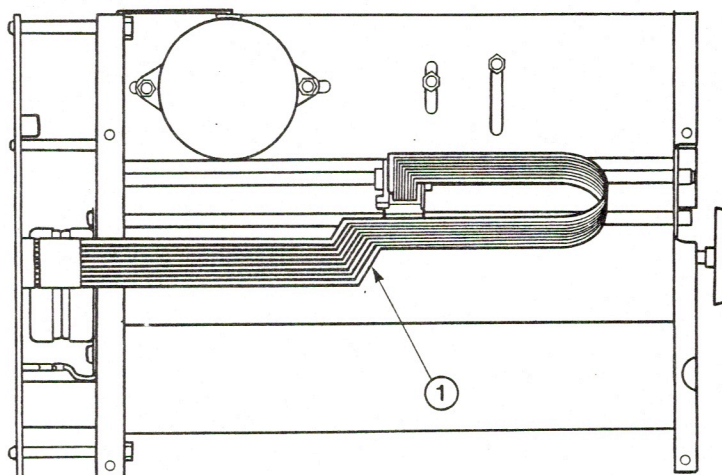




**FIGURE 3**



**FIGURE 4**



**FIGURE 5**



## B. REPLACING THE HEAD CABLE

### Removing the Cable

1. Remove the Silentye cover and base (see section A, p. 1.3).
2. Rotate the pulley (Figure 3) until the print head is in the center of the platen.
3. Using a small screwdriver, pry the cable clip away from the head carrier, forward and down (Figure 4). The cable will fall away from the head assembly.
4. Tip the chassis up so the underside faces you.
5. If the head cable is taped to the chassis, untape it.
6. Unplug the cable from the deserializer card.
7. Pull the cable clip off the other end of the cable. (Don't worry, it does come off.)

### Installing the Cable

8. Hold the new cable up so the change of direction goes upward (Figure 5, #1), and carefully plug it to the deserializer card.

**IMPORTANT:** THE HEAD CABLE IS EASILY DAMAGED. PERFORM THE NEXT STEPS CAREFULLY AND GENTLY. In particular, make sure the cable is fully inserted into the cable clip before connecting the clip to the print head assembly; otherwise you may crimp and crack it.

9. Plug the other end to the cable clip, making sure the small rubber pad is in place between the cable connections and the clip.
10. Bend the cable without twisting, and clip it to the print head assembly (Figure 5).
11. Make certain the cable crosses the left side of the chassis at a right angle, and secure it to the left rail with cellophane tape.



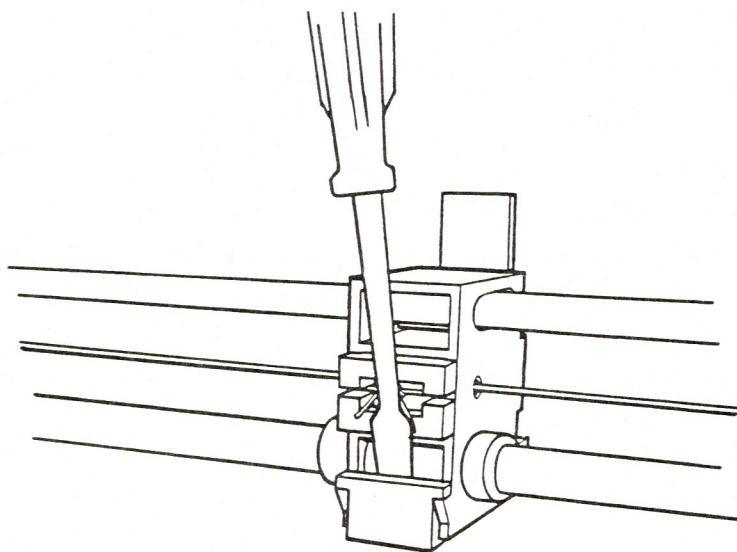


FIGURE 6

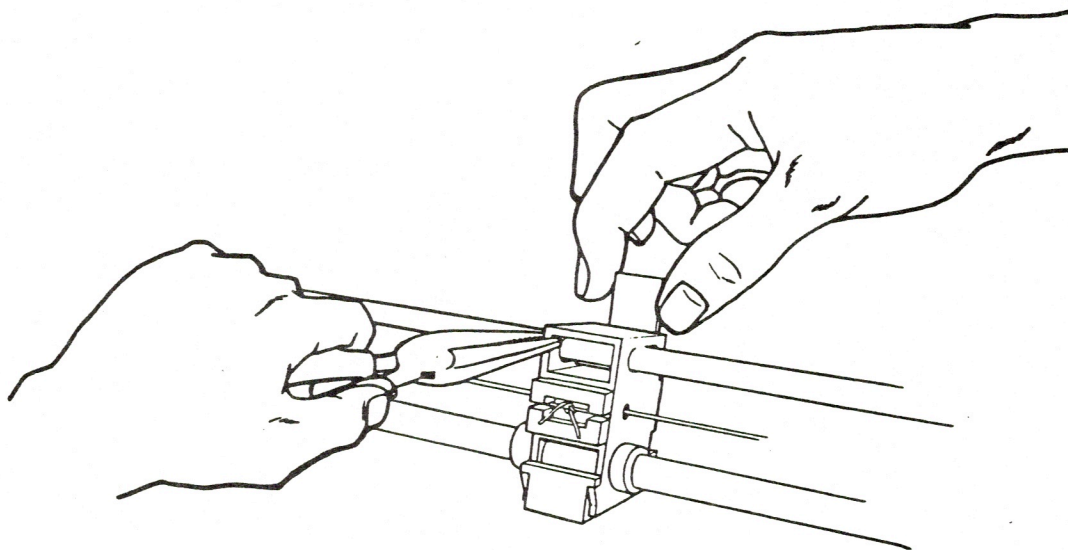


FIGURE 7



## C. REPLACING THE PRINT HEAD

### Removing the Print Head

1. Remove the Silentye cover and base (see section A, p. 1.3)
2. Pry the cable clip off the print head carrier, forward and down (Fig.6). The cable will fall away from the head assembly.
3. Using needlenose pliers, gently pull the head carrier toward the front of the printer (see Figure 7).

**CAUTION:** THE CERAMIC HEAD IS BRITTLE. THAT MEANS IT CAN SHATTER. IT ALSO CAN BE SHARP ENOUGH TO CUT FINGERS. USE CARE WITH THE NEXT OPERATION!

4. With your fingers, pull the head upward -- carefully -- sliding it out of the head carrier (see Figure 7). If you can't pull the head out with your fingers, stand the chassis on end and carefully push the head out of the carrier with a screwdriver.

### INSTALLING THE PRINT HEAD

**NOTE:** The plastic bar that supports the paper is called the platen. It should not be necessary to remove it, but it sometimes falls out, and it is important to replace it SQUARE EDGE UP. Otherwise the print head will short out and ruin the Silentye.

5. Make sure the platen is properly seated and gently pushed back, then slide the new head in with the edge connector on the bottom and the white side facing you.
6. Push the head gently down until it is seated against the plastic stop. If it becomes caught, tilt the chassis up (to see what the problem is) and help it along. Be careful not to shear off the plastic stop at the bottom of the head carrier.



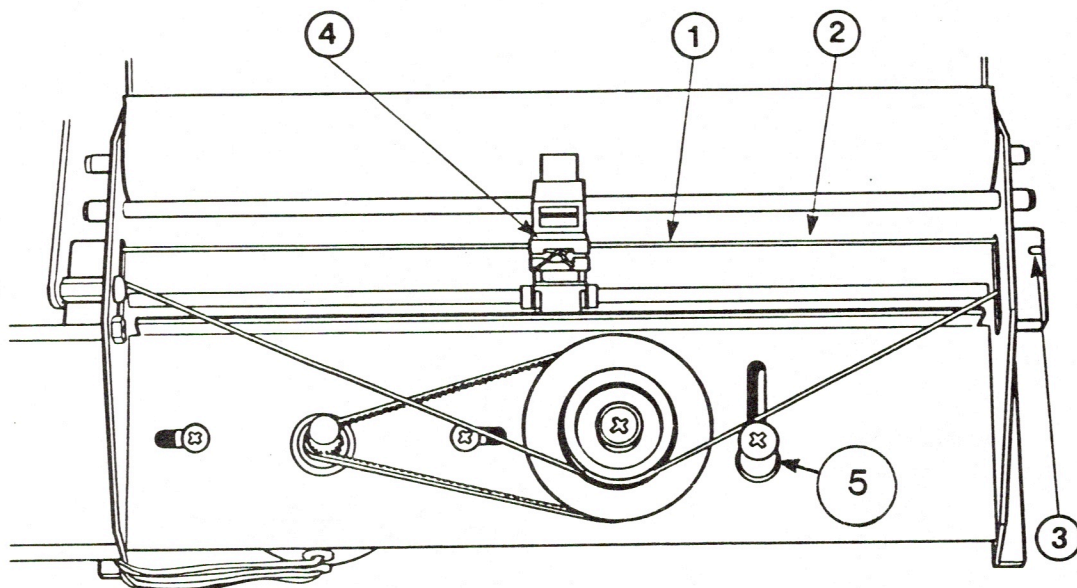


FIGURE 8



#### D. REPLACING THE DRIVE STRING

1. Remove the Silentye cover and base (see section A, p. 1.3).
2. Turn the pulley until the print head is in the middle of the platen.
3. Hold the pulley from beneath with a pair of pliers, and with a screwdriver, loosen the screw.
4. Push the pulley toward the printer, taking the tension off the string; then, with the pulley pushed toward the printer, tighten it back down.

**IMPORTANT:** If the pulley is too close to the printer, it will bind. Make sure it can turn freely when you tighten it down.

5. Hold the idler (Figure 8, #5) from beneath with a pair of pliers, and with a screwdriver, loosen the screw and move the idler towards you. The idler screw can be left loose for right now.
6. Unwind the string from the pulley.
7. Cut the old string on the right side of the print head (Figure 8, #1).
8. Tie a new string (precut to approximately 40") to the right hand portion of the old string (Figure 8, #2).
9. Pull on the old string on the left side of the print head, until the new string is threaded through the right guide (Figure 8, #3), across the front, and through the left guide.
10. Cut the knot out completely.
11. Pry the retainer (Figure 8, #4) out of the head assembly, and discard the old string.
12. Thread the new string into the small holes from the outside of both sides of the head assembly, and tie a loose knot.
13. Pull the knot straight back until the string is taut.
14. Pull the front part of the string toward you about 14 inches; then take the portion of string coming out of the left guide and, starting at the bottom front of the pulley, wrap six turns counterclockwise around the pulley.

**IMPORTANT:** Make sure the loops of string do not overlap; if they do, you will have alignment problems.

15. Grasp the knot and pull until the string is snug.



16. Slip the retainer in place in the print head assembly.
17. Holding the string snug, cut out the old square knot and start a new one.

**NOTE:** Make sure the string runs **between** the idler and the paper.

18. Tighten it, finish the square knot, and cut away the excess string.

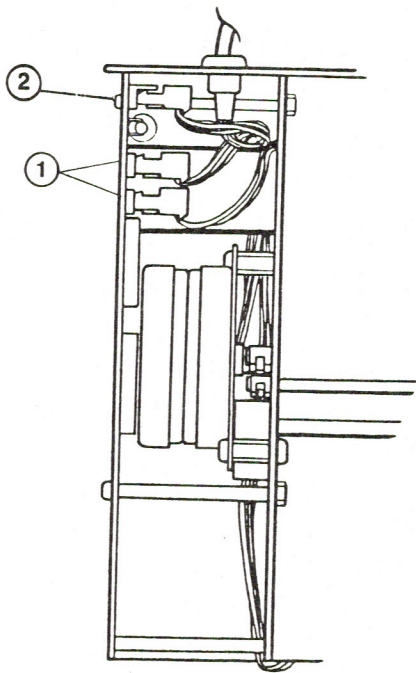


FIGURE 9

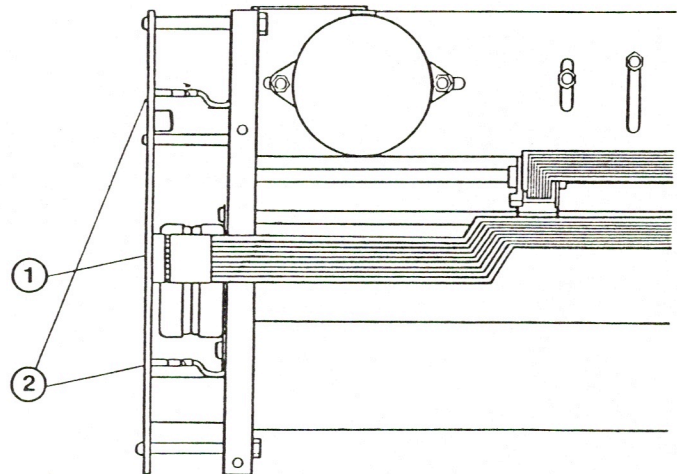


FIGURE 10



## E. REPLACING THE DESERIALIZER CARD

### Removing the Card

1. Remove the Silentype cover and base (see section A).
2. Locate the two motor plugs (Figure 9, #1). Put a piece of tape on the frontmost plug, to identify it.
3. Remove the two motor plugs.
4. Turn the chassis up and disconnect the print head cable (Figure 10, #1).
5. Disconnect the left margin switch connector (Figure 10, #2).

**NOTE:** On the EMI version of Silentype, the left margin switch consists of two wires, as shown in Figure 10. Earlier Silentypes have only one wire (the rear one).

6. Remove the three screws holding the deserializer card to the chassis.

**IMPORTANT:** BEFORE REPLACING THE DESERIALIZER CARD, MAKE SURE THAT THE NEW CARD IS EMI-COMPATIBLE WITH THE CHASSIS. SEE SECTION 5, SILENTYPE MODIFICATIONS.

### Installing the Card

7. Put the card into position, taking care not to capture any wires behind the capacitor, and thread the bottom screw through the spacer and nut until it is "finger-tight".
8. Put in the other two screws. After checking to make sure no wires are caught beneath the spacers, tighten the three screws.
9. If you're working on a non-EMI Silentype, make sure that the bottom screw is tight enough to make good electrical contact. (It is part of the electrical continuity that forms the ground.)
10. Connect the left margin switch wire(s) and the print head cable.
11. Tip the chassis back down. Plug in the motor plugs (on each, the orange wire connects to the top pin) and the interface cable (Figure 10, #1 and 2). Remove the tape from the frontmost plug.
12. Reinstall the base and cover. Make sure all screws are tight.

**NOTE:** Do not apply power while the printer assembly is loose in the base; it may cause a short circuit between the base and the deserializer card.







# Silentype Technical Procedures

## Section 2

### Alignment Procedures

#### Contents:

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---------------------------	-----







## A. Silentype Alignment Procedures

Whenever you change the string on a Silentype, or when a customer complains that the print margins are misaligned, perform the following procedures.

1. Using a known-good Apple II system, make sure the power is off, then plug the Silentype interface card into Slot 1 on the motherboard. Make sure the card is properly seated, and then turn the power on.
2. Place the Apple II Product Diagnostics diskette (P/N 652-0334) in drive 1. Boot the diagnostic and select CARD TESTS from the main menu; then select SILENTYPE TEST from the secondary menu.
3. Accept "Align print head" when that option comes up on the screen. The program will cause the Silentype to print rows of capital H's until you stop it by pressing Y. The rows of H's will allow you to see if there is any misalignment. If there is serious misalignment (more than one dot to the left or right), continue with these procedures.
4. **Check the drive string where it winds around the pulley.** If the loops of string are uneven, overlapping each other, the string tension will be uneven and that will cause misalignment. If necessary, loosen the pulley and re-wrap the string around it so that the loops of string do not overlap.
5. **Check the tension on the drive string.** It should be just tight enough so that it does not slip on the pulley. To adjust it coarsely, loosen the pulley screw and move the pulley to the desired position; then tighten the screw.
6. **Check the tension on the motor belt** (between the motor and the pulley): it should be just tight enough to prevent slipping. Overtightening causes the print head to move unevenly, which makes alignment difficult. (It also causes wear on the bearings.) If necessary, loosen the two motor mounting screws very slightly (the adjustment is easiest if they are slightly tight) and move the motor. Start with a snug but not stretched belt. Print a pair of lines and notice any misalignment. Move the motor slightly to the right and observe the printing of a pair of lines. Repeat until alignment is as good as you can make it; then tighten the motor screws.
7. While the "H's" are printing, **change the position of the idler roller** by loosening the idler screw and moving the idler. This fine-tunes the tension on the string. When alignment is as good as you can make it, tighten the idler screw.







# Silentype Technical Procedures

## Section 3

### Diagnostics

#### Contents:

Aligning the Silentype Printer Mechanism.....	3.3
Other Tests.....	3.4

#### INTRODUCTION

This diagnostic is found on the Apple II Products Diagnostics diskette (Part Number 686-0005) under the main menu selection of CARD TESTS.







## A. ALIGNING THE SILENTYPE PRINTER MECHANISM

1. This test would be run whenever the print quality of the Silentye is poor or the print head does not move smoothly from one margin to the other.
2. To run the test:

- a. Install the Silentye Interface card in slot 1 and connect the Silentye to it.
- b. Boot the Apple II Product Diagnostics diskette.
- c. Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.
- d. Use the <ESC> key to move the cursor to the SILENTYPE TEST line on the card test menu, then press <RETURN>.
- e. Type in "Y" and then press <RETURN> to the prompt:

DO YOU WISH TO ALIGN THE PRINT HEAD  
DRIVE MECHANICS AT THIS TIME?

- f. The Silentye will start printing H's from the left to right margin then reverse direction and print H's from the right to the left margin.

- (1) You can suspend the printing at any time by pressing "Y" to the prompt:

DO YOU WISH TO SUSPEND PRINTING?

- (2) You can then exit the test by pressing "N" to the prompt:

DO YOU WISH TO RESUME PRINTING PATTERN?

- (a) If you answer yes by pressing "Y", the test will resume printing H's.

- g. Observe the quality of the printed characters on the paper for:

- (1) Bidirectional Printing

- (a) If the left and right margins are not even, adjust the Dacron Cord.



- (2) That the Print Head moves evenly from one margin to the other.
  - (a) If the Print Head movement is uneven, adjust the Drive Motor belt tension.
- (3) For all other print quality problems, refer to the Silentype Troubleshooting - Section 4.

## B. OTHER TESTS

1. The remaining tests on the Apple II Product Diagnostics are for testing the carriage and paper drives, printing and variable intensity circuits, and bi-directional print function.
2. To run the tests:
  - a. Install the Silentype Interface card in slot 1 and connect the Silentype to it.
  - b. Boot the Apple II Product Diagnostics diskette.
  - c. Use the <ESC> key to move the cursor to the CARD TESTS line on the main menu, then press <RETURN>.
  - d. Use the <ESC> key to move the cursor to the SILENTYPE TEST line on the card test menu, then press <RETURN>.
  - e. Type in "N" and then press <RETURN> to the prompt:

DO YOU WISH TO ALIGN THE PRINT HEAD  
DRIVE MECHANICS AT THIS TIME?

### 3. Firmware Test

The Firmware test will check the ROMs on the Silentype Interface Card and report their condition to you.

### 4. RAM Test

The RAM test will check the RAM on the Silentype Interface Card and report their condition to you.

### 5. Margin Switch

This test will check the status of the left margin switch and report to you its condition.



## 6. Head Movement

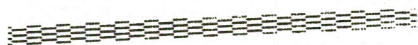
This test will make the print head move back and forth. Observe that the Print Head moves smoothly in both directions.

## 7. Line Feed

This test will send a line feed character to the Silentype. Observe that the paper exits squarely and that there are no wrinkles or creases caused by the paper feed mechanism.

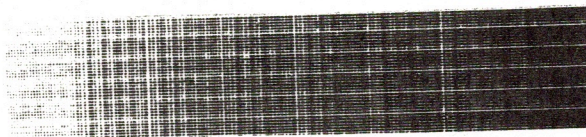
## 8. Print Head Dot Integrity

This test will print a series of lines on the printer paper, each one representing one of the seven dots on the Print Head. Below is an example from a good Silentype Printer:



## 9. Print Intensity Control Test

This test prints out 6 lines on the printer paper which vary in eight degrees of intensity. Below is an example from a good Silentype Printer:



## 10. Bidirectional Print Registration

This test prints parallel vertical lines to verify the Bidirectional Print Adjustment. The tolerance is +/- one dot.

* *	* *	* *
* *	* *	* *
* *	* *	* *
* *	* *	* *
* *	* *	* *
* *	* *	* *
Perfect	Good	Unacceptable







## Silentype Technical Procedures

### Section 4

#### Troubleshooting

**NOTE:** The Silentype printer should be tested with the Apple II Peripherals Diskette. (See **Multi-Product Diagnostics Technical Procedures, Section 1.**)

#### Silentype Troubleshooting Chart

Symptom	Probable Cause
Some dots are not printing.	1) Head Cable 2) Print Head 3) Deserializer Card
One or more dots print continuously.	1) Deserializer Card
Silentype prints wrong characters.	1) Deserializer Card
No print head movement or movement is erratic.	1) Belt Tension Adjustment
Print intensity test fails.	1) Deserializer Card
Silentype will not print bidirectionally.	1) Cord Tension Adjustment
Silentype prints unreadable or no characters; print head moves.	1) Print Head 2) Platen Assembly 3) Deserializer Card
Paper does not advance properly.	1) Paper Bearing Assembly 2) Deserializer Card 3) Paper drive motor

**NOTE:** If the troubleshooting actions listed above do not repair the problem, send the Silentype unit back to Apple for repair.







# Silentye Technical Procedures

## Section 5

### Modifications

#### Contents:

EMI Modifications to the Silentye.....5.3



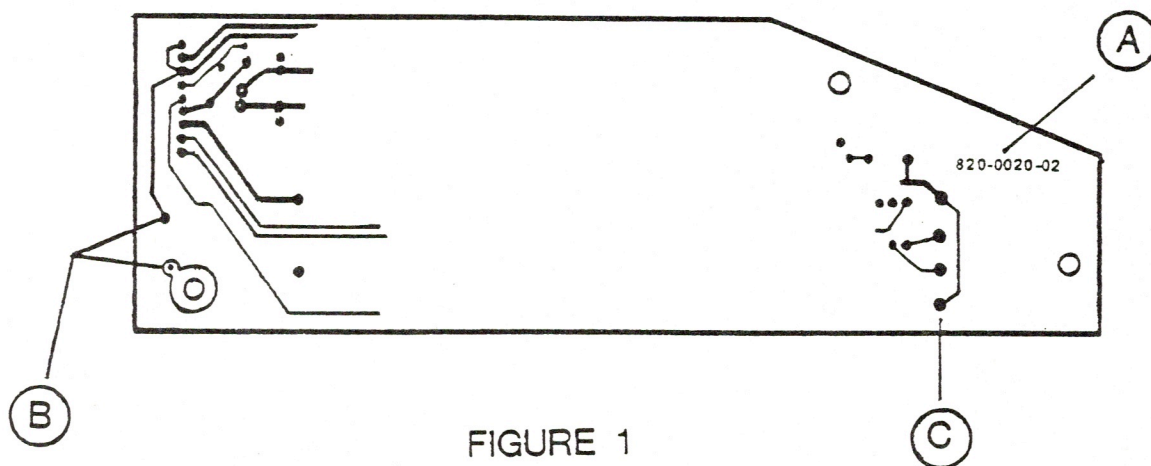


FIGURE 1



## A. EMI MODIFICATIONS TO THE SILENTYPE

Like the Apple II, the Silentype has been modified to reduce the electromagnetic (radio frequency) interference produced by early models. The new versions are called EMI (or RFI) Silentypes.

Only the EMI chassis and deserializer card are now produced and available from Apple, but there are plenty of early-model Silentypes in the field. If you have to swap out the deserializer card on an old, non-EMI Silentype, you will have to replace it with an EMI card; but unless you modify it, the new card will cause the old chassis to print with an uneven left margin. Therefore you need to know how to identify the two types of chassis and deserializer card, and how to modify the EMI card to work with a non-EMI chassis.

### 1. IDENTIFICATION

#### The Chassis

The EMI Silentype chassis has a two-wire left margin switch connector where the earlier Silentype has a single-wire connector. They are also distinguishable by model number: the earlier version has model number A2M0032, the EMI version has model number A2M0036. The model number is printed on the label on the back of the case.

To summarize:

<u>Non-EMI</u>	<u>EMI</u>
Model # A2M0032	Model # A2M0036
One-wire left margin switch	Two-wire left margin switch

#### The Deserializer Card

The EMI card has part number 820-0020-02 printed on the trace side (see Figure 1, A). It has an additional terminal pin (J6) (Figure 1, C) for the extra EMI left margin wire switch.

The non-EMI card bears part number 820-0020-01. It has a single terminal pin (labelled J5) for the left margin switch wire.

More information on the differences between the EMI and non-EMI versions of Silentype can be found in Apple Service Bulletin #39.



## 2. MODIFYING THE EMI CARD

To modify the EMI card for use with a non-EMI chassis, you must solder a jumper wire across two solder pads provided on the card for that purpose (see Figure 1, B). Follow the procedure below:

1. Find the two solder pads on the deserializer card (Figure 1, B). If the holes are filled with solder, open them using a soldering iron and solder sucker.
2. Take a one-inch piece of 20- to 24-gauge insulated wire. Remove approximately 1/4 inch of insulation from each end of the wire.
3. Insert one end of the jumper through the hole in one of the solder pads (from the trace side of the board). Solder it into place. Do the same for the other end and the other solder pad.
4. Snip off any excess jumper wire that may protrude on the other side of the card.
5. Install the deserializer card in the printer as usual. Note that the left margin switch wire from the chassis should connect to post J5 on the card and that J6 (Figure 1, C) will not be used.

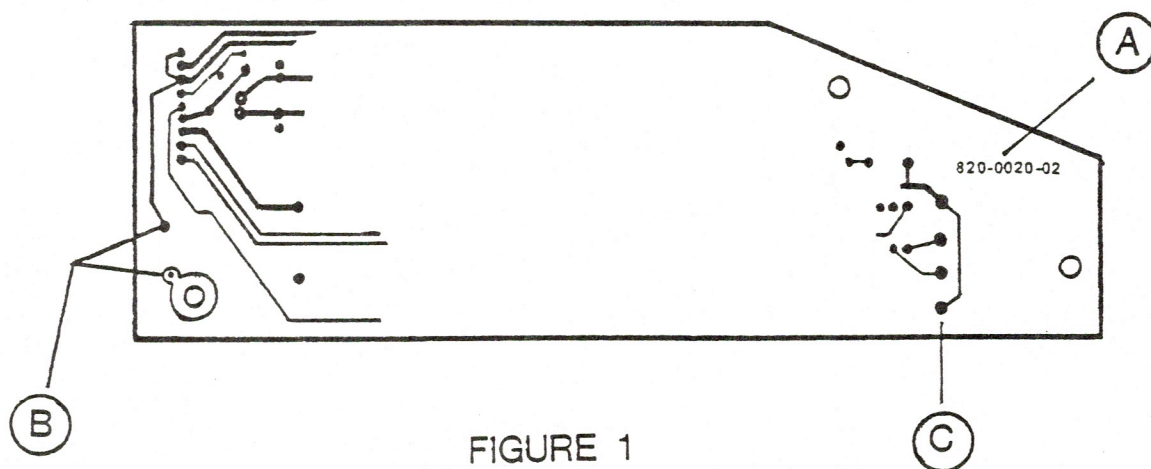


FIGURE 1



# Silentype Printer Technical Procedures

## Section 6

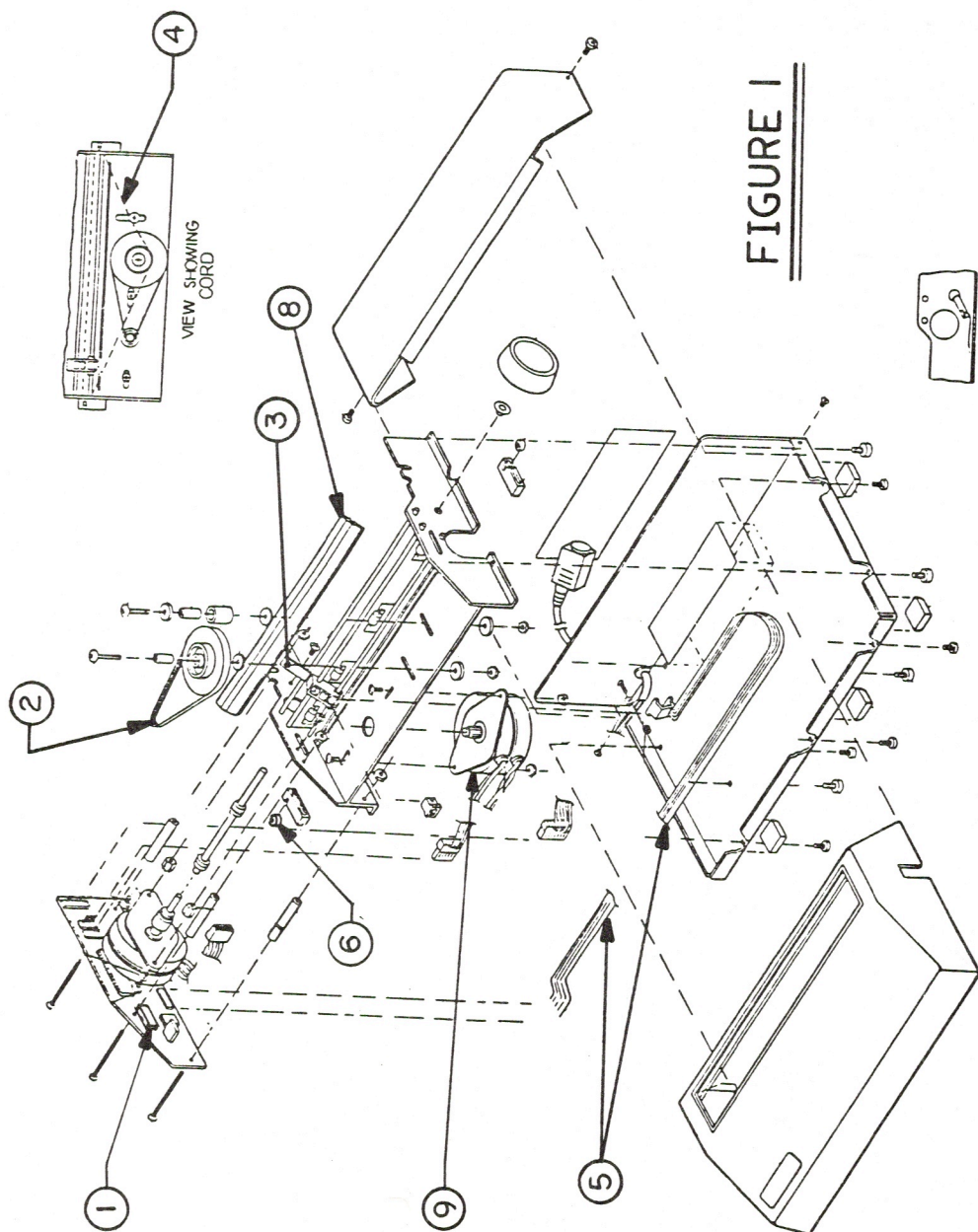
### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Silentype Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

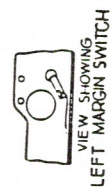
#### Contents:

Printer.....	6.3
Interface Card ICs.....	6.5





**FIGURE 1**



VIEW SHOWING  
LEFT MARGIN SWITCH



# **SILENTYPE PRINTER (Figure 1)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	305-0000	IC 74LS00N
2	970-0443	Head Drive Belt
3	970-0418	Print Head, Silentye
4	970-0442	Dacron Cord
5	970-0401	Head Cable
6	970-0410	Cord Pulley
7	970-0406	Paper Bearing Assembly
8	970-0402	Silentye Platen
9	970-0404	Motor, Head Assembly T200-01



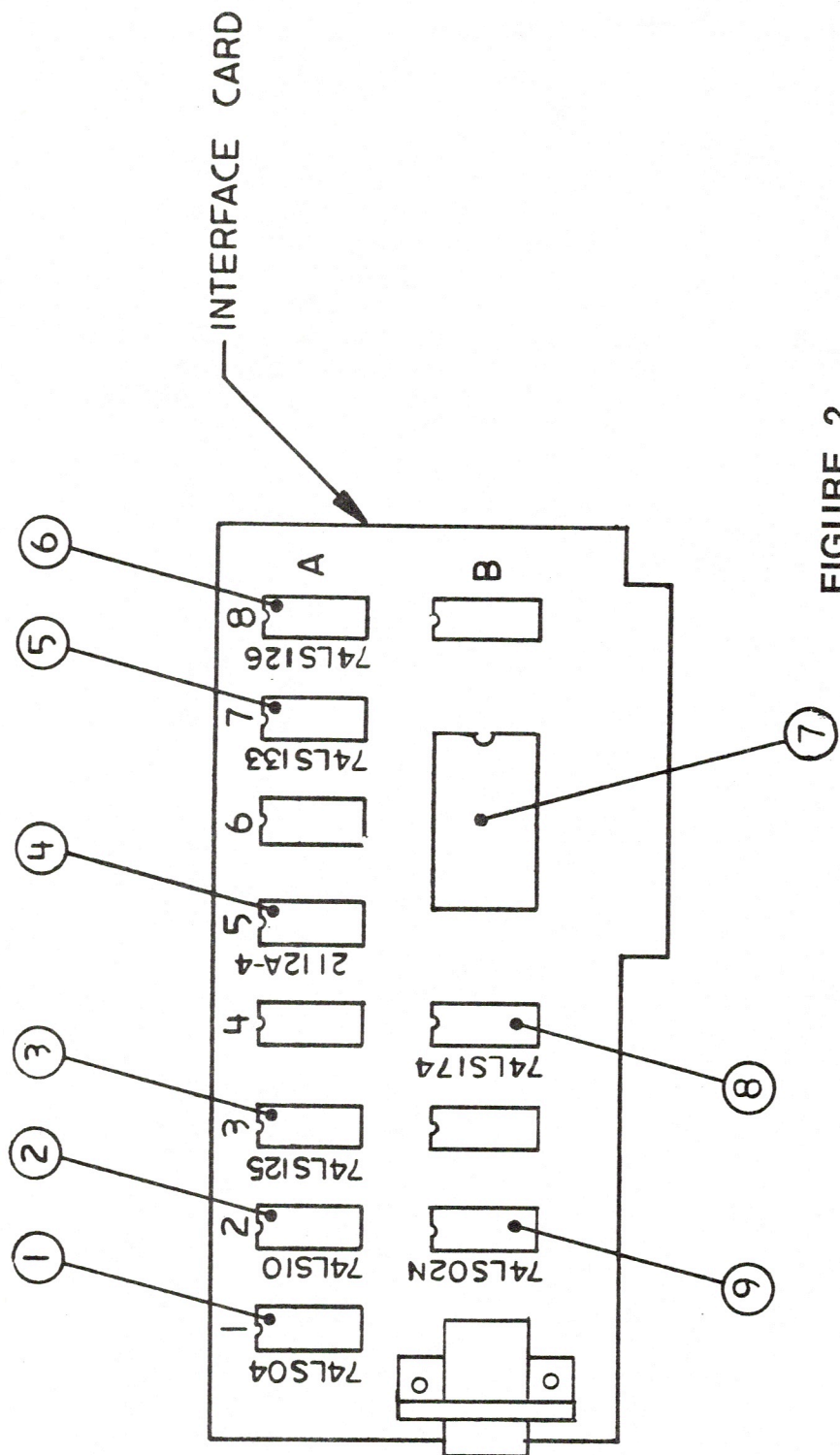


FIGURE 2

# SILENTYPE PRINTER - INTERFACE CARD ICs (Figure 2)

Item	Part No.	Description
1	306-0004	IC 74LS04
2	305-0010	IC 74LS10
3	306-0125	IC 74LS125
4	334-2112	RAM 256x4 2112A-4
5	306-0133	IC 74LS133
6	305-0126	IC 74LS126
7	342-0039	ROM Silentye Control
8	306-0174	IC 74LS174
9	306-0002	IC 74LS02N





# DOT MATRIX PRINTER TECHNICAL PROCEDURES

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**End of Silentype  
Printer Section Start  
of Dot Matrix Printer  
Section**

# Dot Matrix Printer Technical Procedures

## Section 1

### Introduction

#### Contents:

Power On and Off.....	1.3
Load Paper.....	1.3
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Remove Ribbon Cartridge.....	1.5
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Set Configuration Switches.....	1.9
SW 1 Switch Settings.....	1.10
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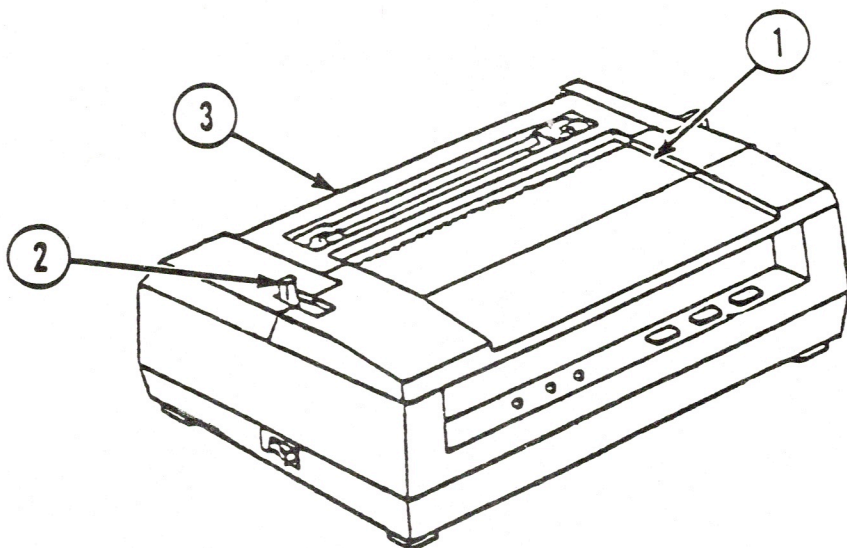


FIGURE 1

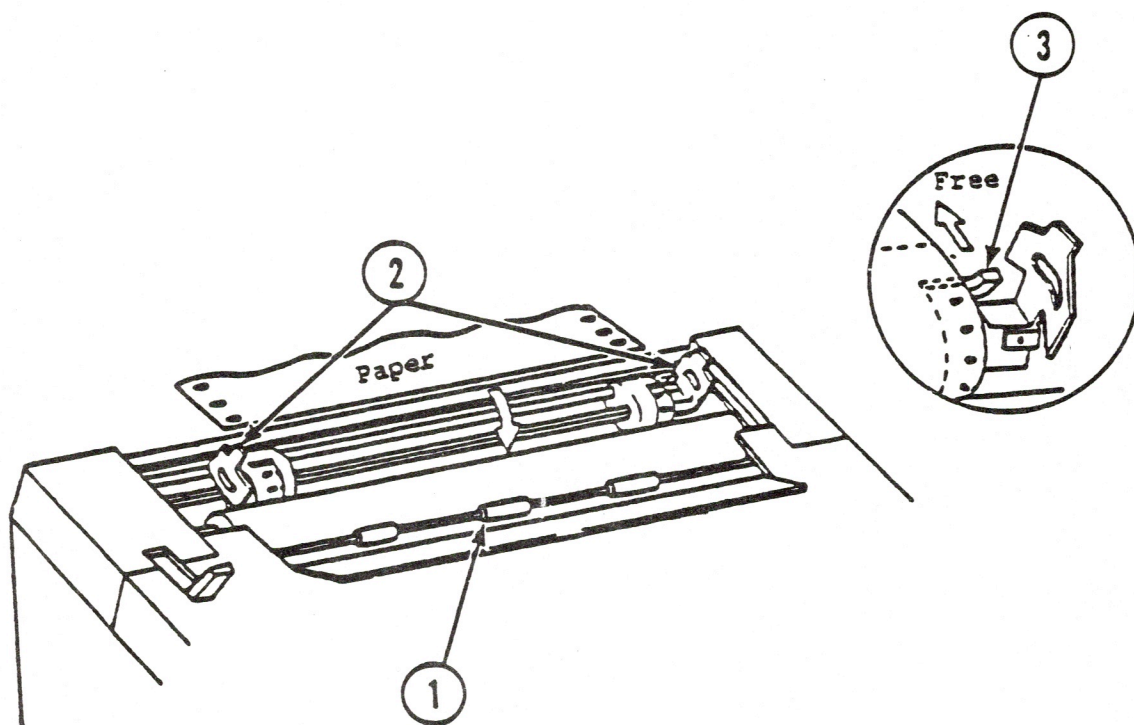


FIGURE 2

**A. POWER ON AND OFF, LOAD AND REMOVE PAPER AND RIBBON CASSETTE, AND RUN SELF-TEST**

**Power on and off**

1. Plug the power cable into the back of the printer.
2. Plug the power cable into an electrical outlet.
3. Flip the power switch to ON.
4. Check the front panel. Make sure the POWER light comes on.
5. Flip the power switch to OFF.

**Load paper**

1. Make sure the power is off.
2. Raise the paper cutter toward you. (See Figure 1, #1.)
3. Pull the paper release level forward. (See Figure 1, #2.)
4. Remove the paper cover. (See Figure 1, #3.)
5. Pull the paper roller shaft forward. (See Figure 2, #1.)
6. Lift the covers off the right and left tractor sprockets. (See Figure 2, #2.)
7. Make sure the left tractor is all the way over to the left. To adjust the tractor, push back the white lever. (See Figure 2, #3.) Move the tractor all the way over to the left. To lock the tractor in place, pull the white lever back toward you.



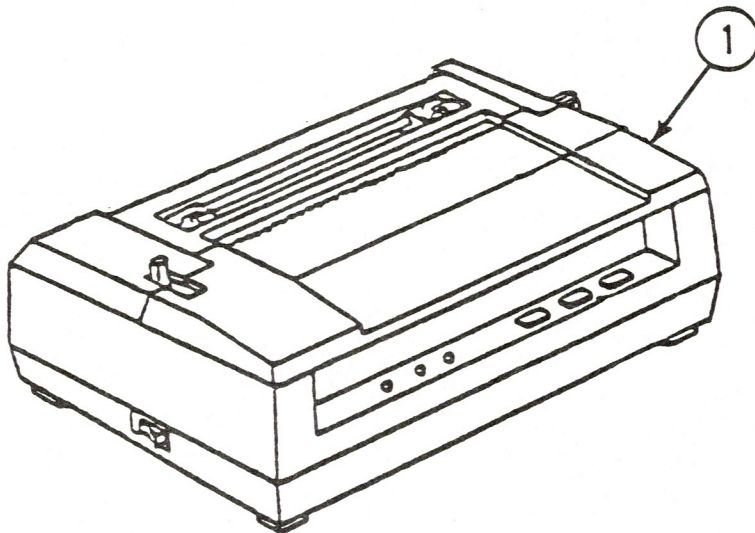


FIGURE 3

8. Insert the paper over sprockets. If the paper doesn't line up with the sprockets, adjust the right tractor until it does.
9. Push down the covers on right and left tractor sprockets.
10. Turn the platen knob until the paper comes through.
11. Push back the roller shaft.
12. Push back the release lever.
13. Put the paper cover back on.
14. Push back the paper cutter.

#### **Remove Paper**

1. Make sure the power is off.
2. Pull the paper cutter toward you.
3. Remove the paper cover.
4. Pull the release lever forward.
5. Turn the platen knob to back out the paper.

#### **Remove Ribbon Cassette**

1. Make sure power is off.
2. Remove the carrier cover. (See Figure 3, #1.)
3. While pushing down on the cassette latch arms, lift up the cassette.
4. Replace the carrier cover.



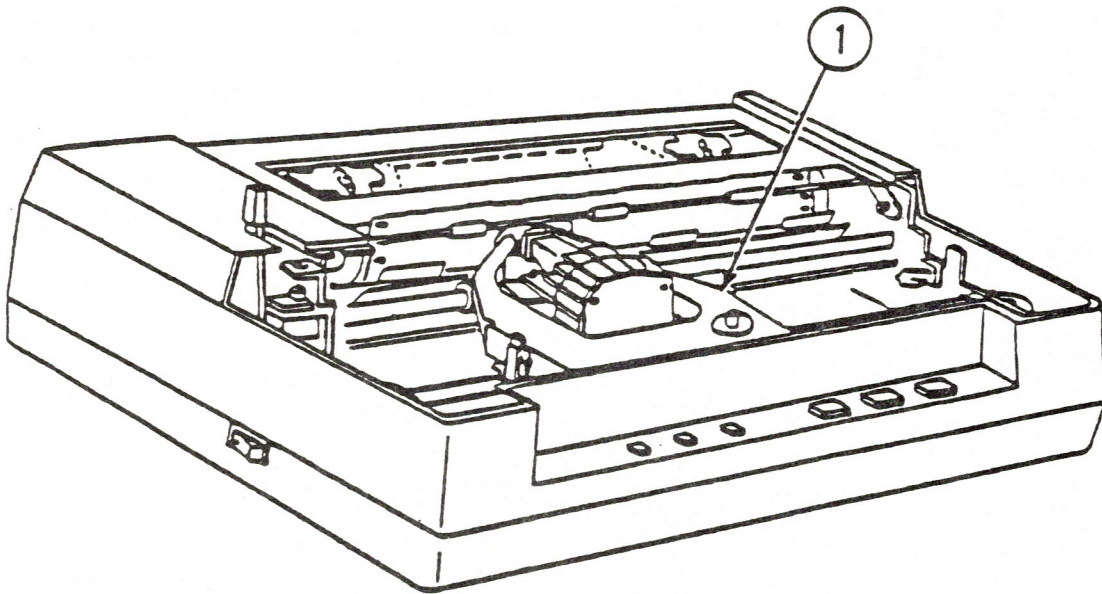


FIGURE 4

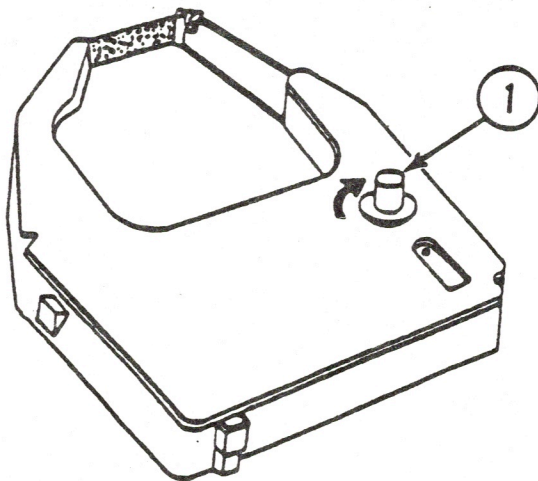


FIGURE 5

### **Load Ribbon Cassette**

1. Make sure the power is off.
2. Remove the carrier cover.
3. Get a ribbon cassette.
4. Put the cassette on the ribbon support plate.
5. Push down on the cassette until it snaps in place. (See Figure 4, #1.)
6. On the cassette, turn the knob as shown until you hear it "click" and the ribbon is taut. (See Figure 5, #1.)
7. Replace the carrier cover.

### **Run Self-test**

**NOTE:** When you run the self-test, you should always use a brand new ribbon and a single sheet of paper. Before you begin the test, push up the red head adjusting lever on the right side of the printer.

1. Make sure the power is off.
2. Load the paper. Make sure the paper is secure under the roller shaft.
3. To run self-test, press and hold the T.O.F. switch on the front panel, then switch the power on. The printer will then start printing out lines of characters. Each line contains the letters of the alphabet, the numbers 0 through 9, and a series of typographical characters.
4. To end the test, set the power switch to OFF.



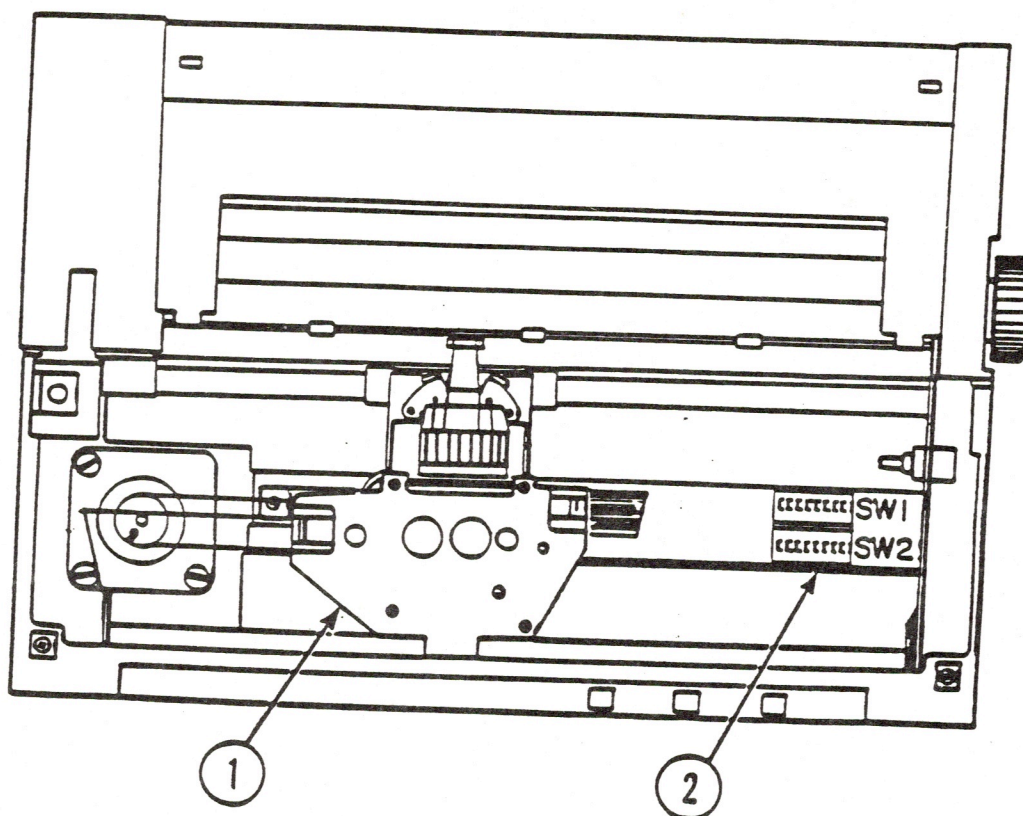


FIGURE 6

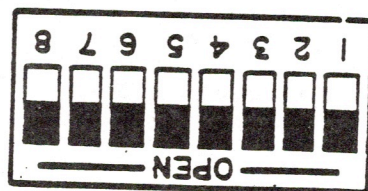


FIGURE 7

## **B. SET CONFIGURATION SWITCHES**

For this procedure you will need:

A tiny flat blade screwdriver

1. Make sure the power is off.
2. Remove the paper and the carrier cover.
3. Slide the carrier all the way to the left. (See Figure 6, #1.)
4. Locate switches SW 1 and SW 2. (See Figure 6, #2.)
5. Pull the plastic strip out of the way.
6. Using a small screwdriver, set all the SW 1 switches to OPEN. (See Figure 7.)
7. Using the chart on the next page, set all SW 1 switches to their normal setting.



# SW 1 SWITCH SETTINGS

SWITCH	NORMAL SETTING	PURPOSE
1	OPEN	Switches 1-3 select which set of national characters will be printed.
2	CLOSED	If you set the switches to OPEN, CLOSED, OPEN, the printer will print
3	OPEN	United States characters.
4	OPEN	Switch 4 selects paper length. Set the switch to OPEN for paper that is 11 inches long. (66 lines)
5	OPEN	Switch 5 determines if a host computer can put the printer on-line and off-line. If you set the switch to OPEN, the host computer will have this capability.
6	OPEN	The computer sends characters to the printer. Sometimes the printer stores these characters without receiving a command to print them. When the printer's memory is full, it can do one of two things when it receives a print command. 1) It can go to a new line on the page and begin printing. 2) It can print from wherever the print head is at the time the print command is received. Normally, you want the printer to start where it left off, so set switch 6 to OPEN.
7	CLOSED	The computer tells the printer to start printing by sending a print command. There are a number of print commands. They include Carriage Return, Linefeed, Vertical Tab, and Formfeed characters. Normally, you want any of these characters to start printing. So set Switch 7 to CLOSED. If Switch 7 is set to OPEN, only a Carriage Return character will start printing.
8	OPEN	If the host computer sends a Linefeed following the Carriage Return, set switch to OPEN. If host does not send the Linefeed, the printer will add a Linefeed when switch is CLOSED.

8. When you finish setting the switches, make sure SW 1 looks like this:

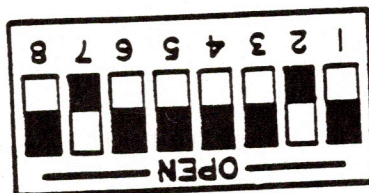


FIGURE 8

9. Using a small screwdriver, set all SW 2 switches to OPEN.
10. Using the chart on the next page, set all SW 2 switches to their normal setting.



# SW 2 SWITCH SETTINGS

SWITCH	NORMAL SETTING	PURPOSE
1	CLOSED	The number zero can be printed with a slash through it. This way the user won't confuse it with the letter O. Set the switch to CLOSED to print slashed zeroes.
2	OPEN	This switch determines the size of the printer's memory. To get the largest memory possible, set this switch to OPEN. CLOSED is only 1 line buffer.
3	Not Used	The printer doesn't use these switches.
4	Not Used	It doesn't matter if they are OPEN or CLOSED.
5	CLOSED	Set to OPEN for 10 characters per each inch regardless of the size of each character. Set to CLOSED to have the printer adjust spacing for character size. Other print modes are software selectable.
6	CLOSED/ OPEN	This switch tells the printer to expect either a 7-bit or 8-bit data from the computer. If you're using an interface that uses 7-bit data, set it to CLOSED. If you're using an 8-bit interface, set it to OPEN.
7	CLOSED	If this switch is set to CLOSED, the printer will be automatically on-line (SEL LIGHT) whenever it is turned on. If you want the printer to be off-line, (NOT SEL) however, set it to OPEN.
8	OPEN	If this switch is set to OPEN, the printer will be able to print in both directions. If you set it to CLOSED, the printer will only be able to print from left to right.

11. When you finish setting the switches, make sure SW 2 looks like this:

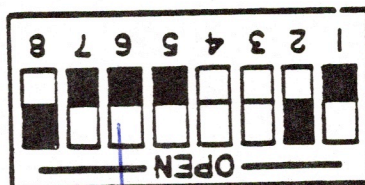


FIGURE 9

12. Push the plastic strip back over the switches.  
13. Replace the carrier cover.  
14. Run the self test.



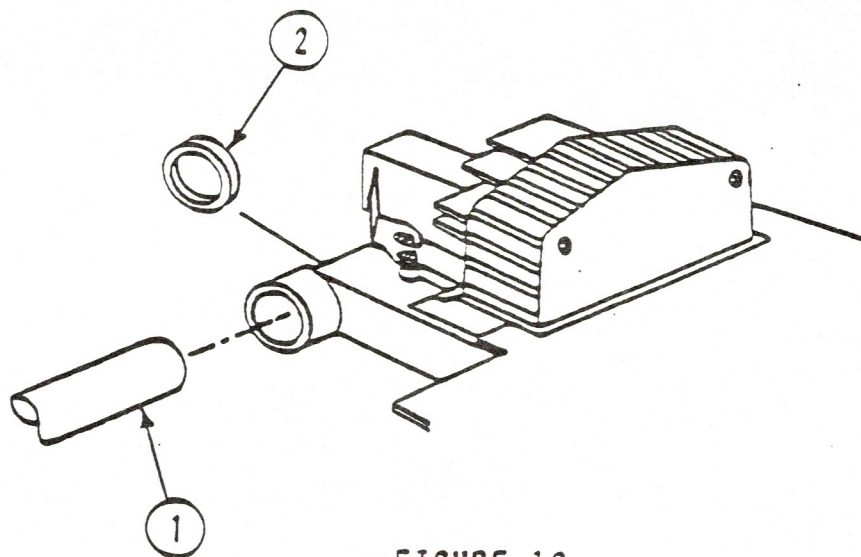


FIGURE 10

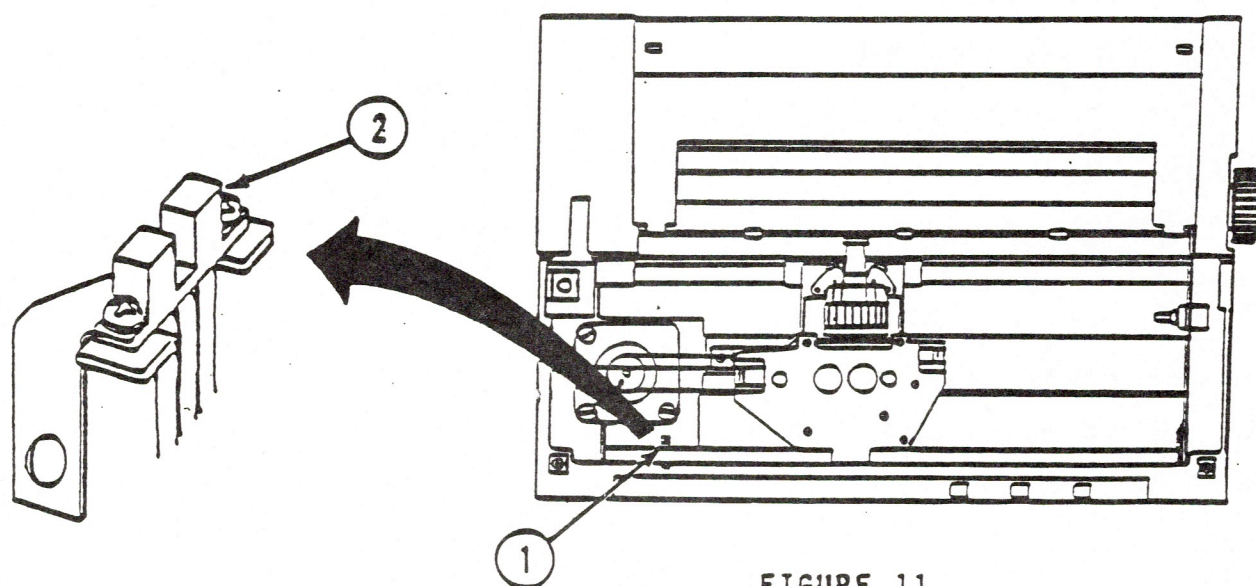


FIGURE 11

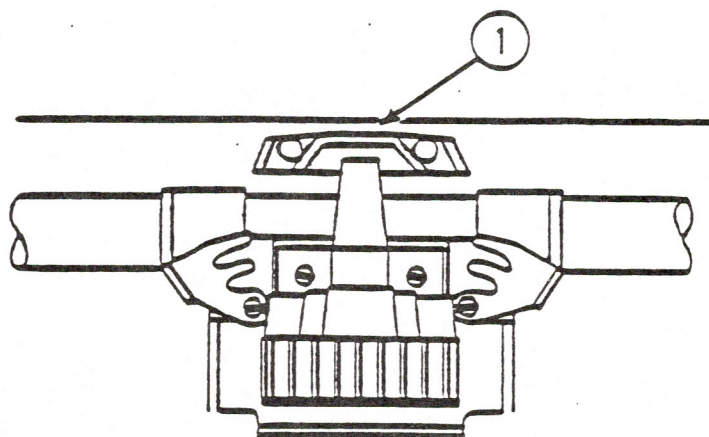


FIGURE 12

### C. PERIODIC MAINTENANCE

You should clean the printer as required. You should lubricate the printer only once a year.

1. Make sure the power is off.
2. Remove the paper cover and the carrier cover.
3. Remove the paper and ribbon cassette.
4. On the carrier shaft, wipe off any dirt with dry gauze or absorbent cotton. (Figure 10, #1.)
5. On the lubrication ring, apply a small amount of lubrication oil. (Figure 10, #2.)
6. Find the detector plate. It is on the left front side of the printer, hidden just below the guide rail. (Figure 11, #1.)
7. Using a brush, remove any paper dust. (Figure 11, #2.)
8. Clean the dot head (Figure 12, #1) with a low residue cleaner, such as isopropyl alcohol or freon, and a lint-free cloth.
9. Replace the ribbon cassette.





# Dot Matrix Printer Technical Procedures

## Section 2

### Take-Apart

#### Contents:

Remove Switch Panel.....	2.3
Replace Switch Panel.....	2.4
Remove Ribbon Wire.....	2.7
Replace Ribbon Wire.....	2.9
Remove CPU PC Board.....	2.11
Replace CPU PC Board.....	2.13
Remove, Replace, and Adjust Dot Head.....	2.15
Remove Carrier Wire.....	2.17
Replace Carrier Wire.....	2.21
Remove Mechanical Assembly.....	2.27
Replace Mechanical Assembly.....	2.29
Remove Carrier Motor.....	2.31
Replace Carrier Motor.....	2.31
Remove the Transformer.....	2.33
Replace the Transformer.....	2.33
Locate Carrier Motor Driver Transistor.....	2.35
Remove and Replace Voltage Regulator Transistor.....	2.35



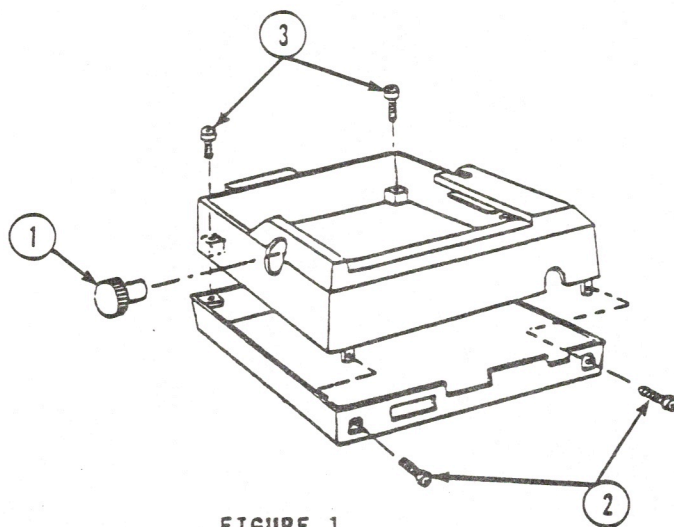


FIGURE 1

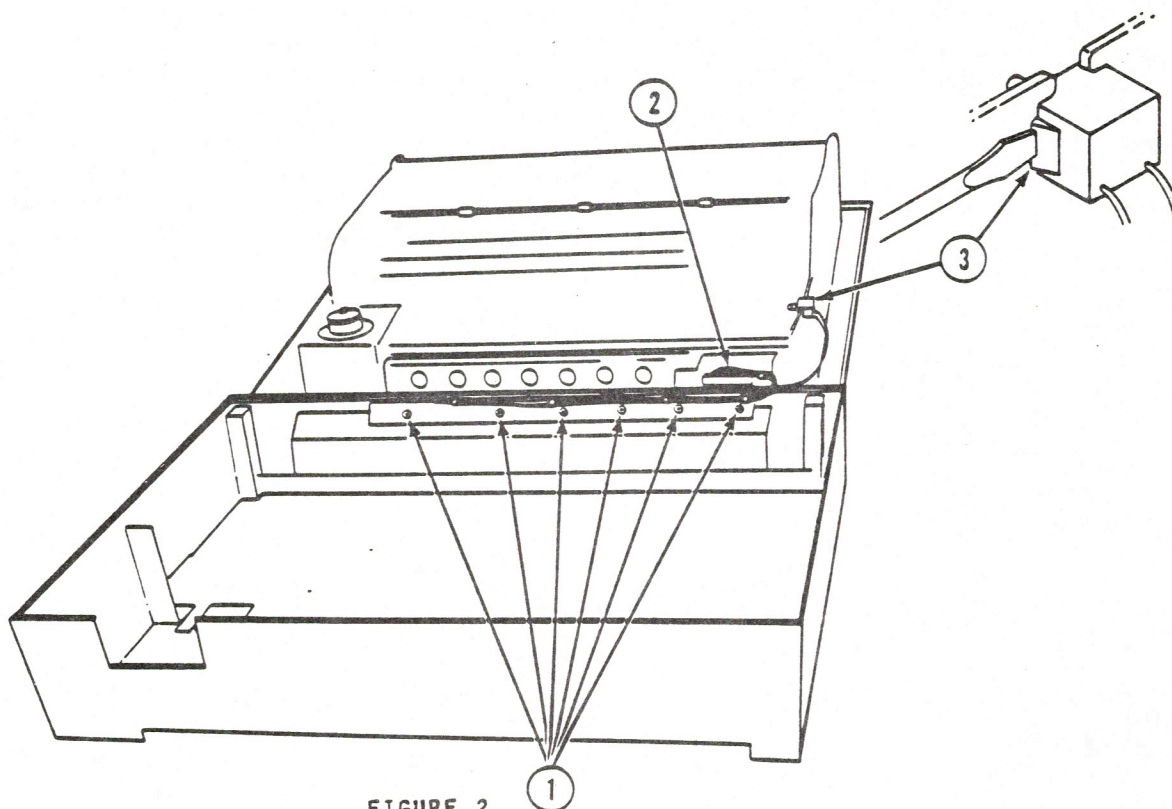


FIGURE 2

## A. REMOVE AND REPLACE THE SWITCH PANEL

For these procedures you will need:

Two Phillips screwdrivers (#1, #2)  
Small flat blade screwdriver

### Remove:

1. Remove the power cord from printer.
2. Remove the carrier cover.
3. Pull off the platen knob. (See Figure 1, #1.) If it doesn't come off easily, place the blade of a flat blade screwdriver in the slot of the shaft of the platen knob (i.e., where the knob attaches to the platen). Twist the screwdriver, thereby widening the knob so you can pull it off.
4. To remove the top cover, remove the two screws at the rear of printer. (See Figure 1, #2.)
5. Remove the two screws at the front of printer. (See Figure 1, #3.)
6. Lift the top cover up. Place it face down on the table.
7. Remove the six screws from the back of the switch panel. (See Figure 2, #1.)
8. Pull the switch panel connector from the CPU board. The connector is in the "well" at the right front of the printer. Reach down into the "well" to find it. If you have trouble getting the connector free, carefully use a flat bladed screwdriver to pry it loose. (See Figure 2, #2.)
9. Using a flat blade screwdriver, depress the latches on both sides of the limit switch and push the switch in toward the center of the printer. (See Figure 2, #3.) Lift the wire free from the slot.
10. Pull the switch panel free.



**Replace:**

1. Put the switch wire back into the slot. Push the limit switch back until it clamps in place. It should be snug with side frame.
2. Attach the switch panel connector to the CPU board.
3. Replace the six screws in the back of the switch panel.
4. Pull the top cover back over the printer.
5. Replace the carrier cover and the platen knob.
6. Plug the printer back in.
7. Power on. Check that power lamp lights.





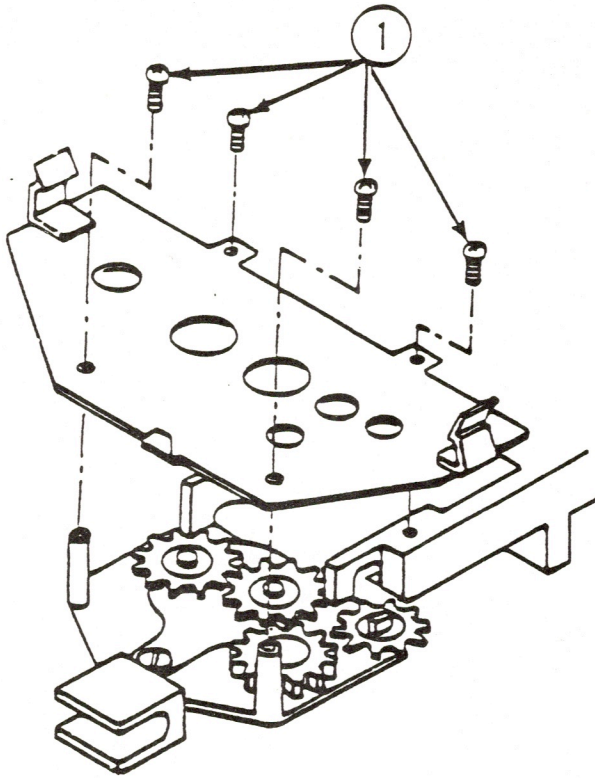


FIGURE 3

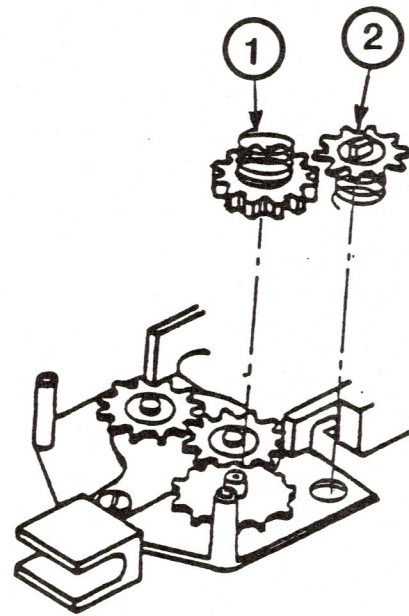


FIGURE 4

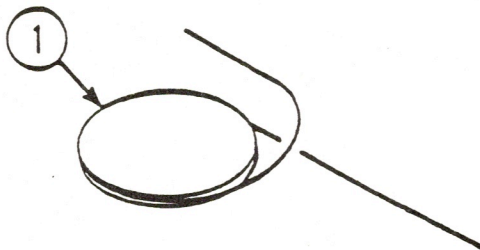
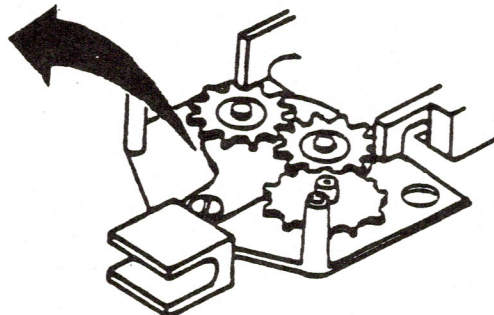


FIGURE 5



## B. REMOVE AND REPLACE THE RIBBON WIRE

For these procedures you will need:

Small Phillips screwdriver

### Remove:

1. Remove the power cord.
2. Lift off the carrier cover and pull off the platen knob (Section 2A, page 2.3).
3. Lift off the top cover. Set it face down.
4. For easier access to the ribbon wire, disconnect the top cover from the printer. To do this, pull the switch panel connector from CPU board. Push the limit switch in toward center of board and lift the wire free. Remove the top cover and set it out of the way.
5. Remove the ribbon cassette (Section 1A, page 1.5).
6. Remove the four cassette mount plate fixing screws. (See Figure 3, #1.)
7. Slowly lift off the cassette mount plate.  
  
**NOTE:** There are springs beneath the cassette mount plate (See Figure 4). They may pop out when you lift up the mount plate.
8. Pull up the ratchet gear and ratchet spring. (See Figure 4, #1.) If they don't come off easily, carefully pry them off with a flat blade screwdriver.
9. Pull off the cassette drive gear and the ribbon spring. (See Figure 4, #2.)
10. Notice how the ribbon wire is wrapped around the ribbon pulley gear. (See Figure 5, #1.) Also, notice how the ribbon wire goes through the carrier assembly. This will help you when you have to replace the ribbon wire.



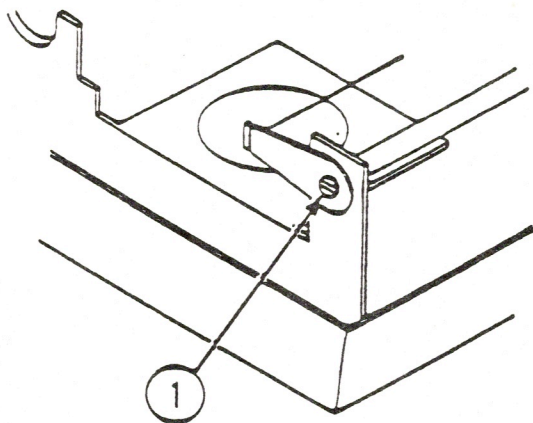


FIGURE 6

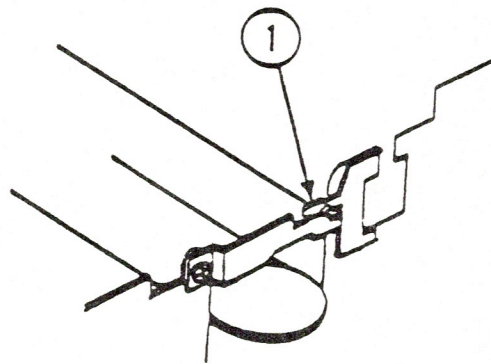


FIGURE 7

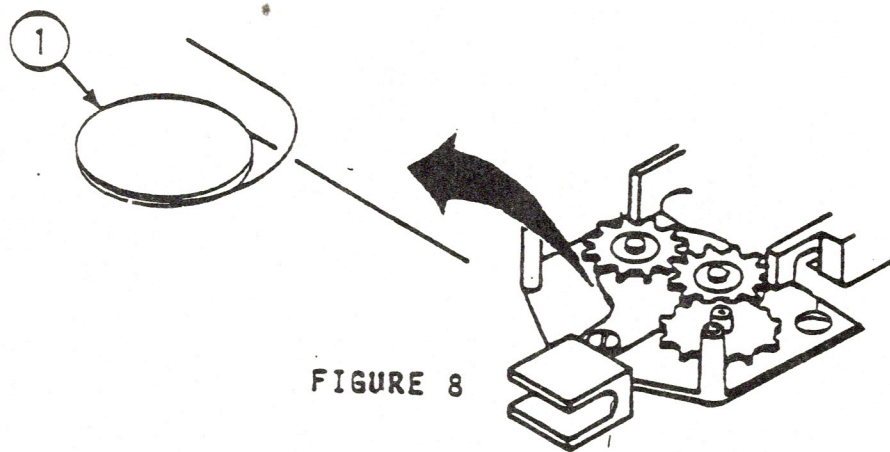


FIGURE 8

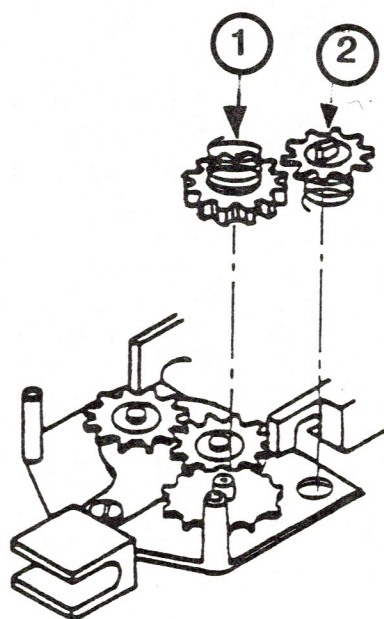


FIGURE 9

11. Loosen the screw on the ribbon wire arm on the left side of the printer (See Figure 6, #1.) Just give it a few turns to ease the tension on the wire.
12. Remove the wire from the wire holder on the right side of the printer. (See Figure 7, #1.)
13. Remove the other end of the wire from the wire holder on the left side of the printer.
14. Work the wire free from the ribbon pulley gear. Pull the wire out of the printer.

**Replace:**

1. Attach one end of the ribbon wire to the wire holder on the right side of the printer.
2. Work the wire around the pulley gear as shown. (See Figure 8, #1.)
3. Attach the other end of the ribbon wire to the wire holder on the left side of the printer.
4. Tighten the ribbon wire arm.
5. Replace the ratchet spring and ratchet gear. (See Figure 9, #1.)
6. Replace the ribbon spring and cassette drive gear. (See Figure 9, #2.)
7. Replace the cassette mount plate and ribbon cassette.
8. Replace the top cover, carrier cover, and platen knob.
9. Run the self-test.



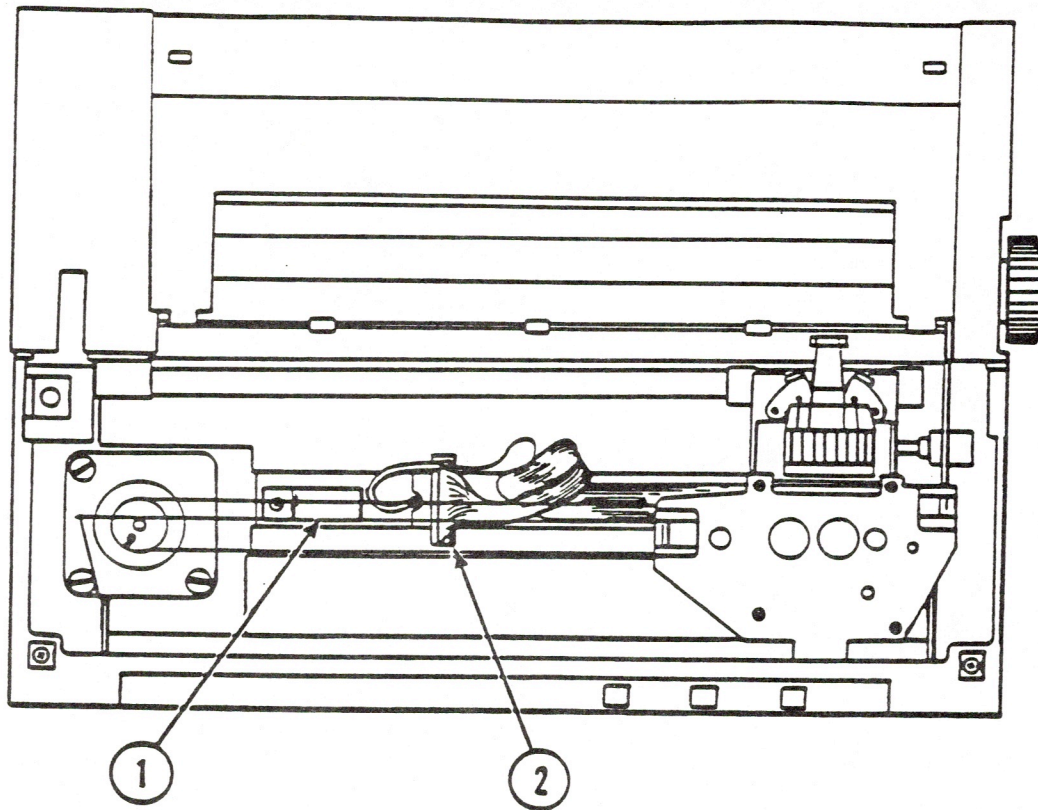


FIGURE 1

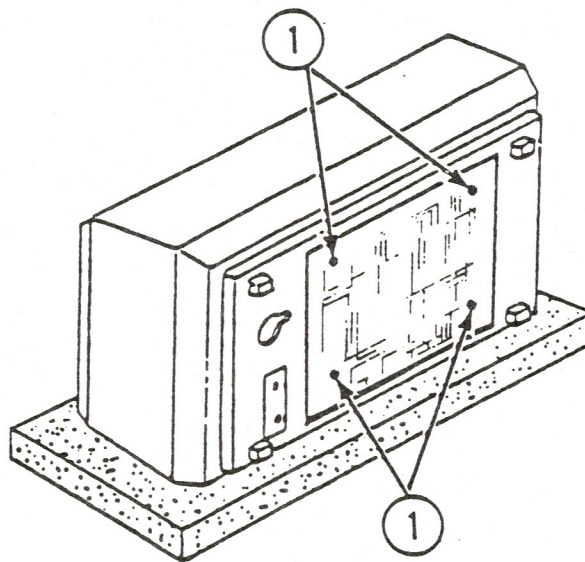


FIGURE 2

### C. REMOVE/REPLACE THE CPU PC BOARD

For these procedures you will need:

5.5mm Nutdriver  
8mm Nutdriver  
Phillips Screwdriver

#### Remove:

1. Disconnect the power cord.
2. Remove the carrier cover, the paper cover and the platen knob.
3. Remove the top cover. Be sure to detach the switch panel connector from the CPU PC board. Put the cover somewhere out of the way.
4. Slide the carrier all the way to the right.
5. Loosen, but do not remove, the metal clip and gently pull up the ribbon until you can reach the dot head connector. (See Figure 1, #1.)
6. Gently work free the dot head connector. (You might use the needle nose pliers to grasp the connector.) (See Figure 1, #2.)
7. Tuck the dot head connector under the cable so it stays out of the way.
8. Using a pad or cushion for protection, set the printer on its back. (See Figure 2.)
9. Use a 5.5mm nutdriver to remove the four nuts from the bottom panel.
10. Pull off the panel.
11. Use an 8mm nutdriver to remove the four CPU PC board nuts. (See Figure 2, #1.)
12. Gently pull the board toward you. This will help you reach the plastic connectors on the board.
13. Using your fingers, work off the plastic connectors. (Do not pull on cable.) As you disconnect them, note the position of each connector.



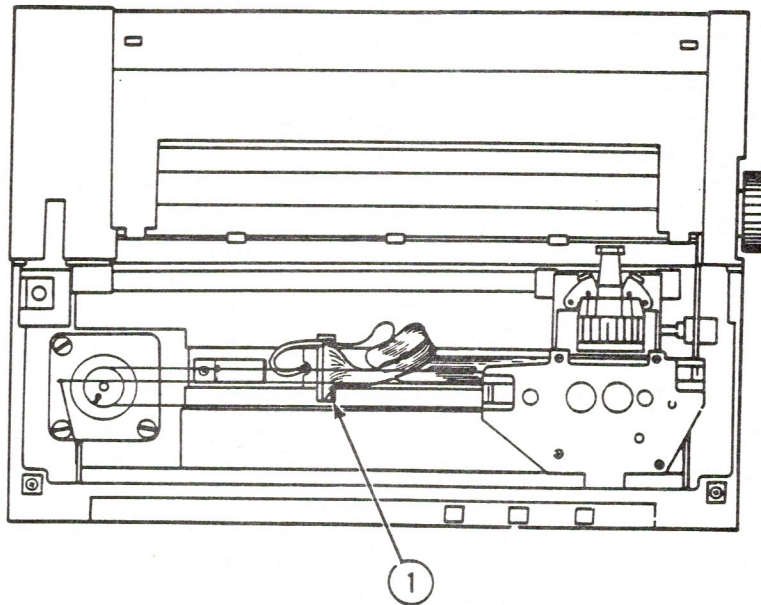


FIGURE 3

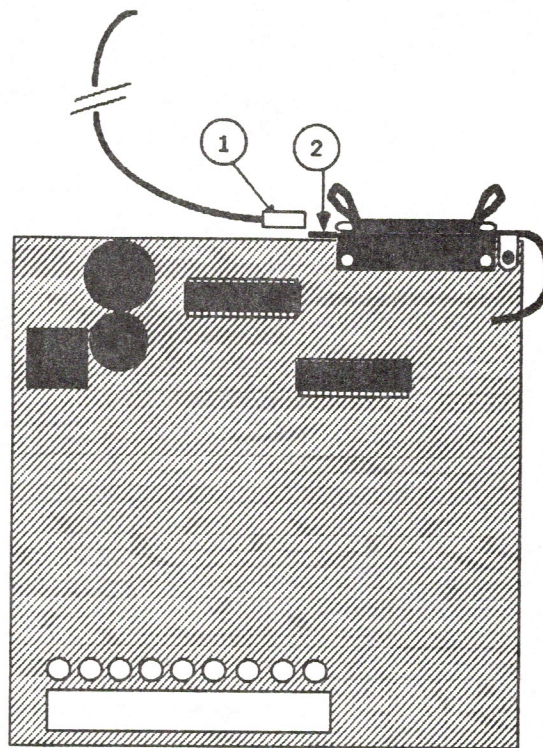
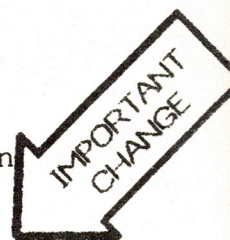


FIGURE 4

**CAUTION: THE BOARD CAN BE DAMAGED BY STATIC ELECTRICITY.**



14. When you have all the connectors off, lay the board down on table.

15. Slide the chassis grounding strap (Figure 4, #1) off the ground lug.

**IMPORTANT:** Leave the ground lug (Figure 4, #2) attached to the board. If you send the board to Apple for exchange, all ground lugs must be present on the board.

16. To avoid damaging the board, be careful not to handle the surface of the board. When you carry away the board, be sure to hold it by its edges.

**Replace:**

1. Line up the board with printer.
2. Connect the grounding strap.
3. Connect the six plastic connectors.
4. Replace the four CPU PC board nuts.
5. Push the bottom window back into place. Connect the four window nuts.
6. Turn the printer right side up.
7. Push the dot head connector back into CPU PC board. (See Figure 3, #1.)
8. Fold the dot head cable under the metal clip. Tighten down the metal clip.
9. Slide the carrier back and forth a few times. It should slide freely from end to end. If the carrier catches on the metal clip, go back and re-fold the dot head cable.
10. Replace the top cover. Be sure to plug the switch panel connector back into the CPU PC board.
11. Replace the carrier cover, the paper cover, and the platen knob.
12. Turn the power on.
13. Perform the self-test.



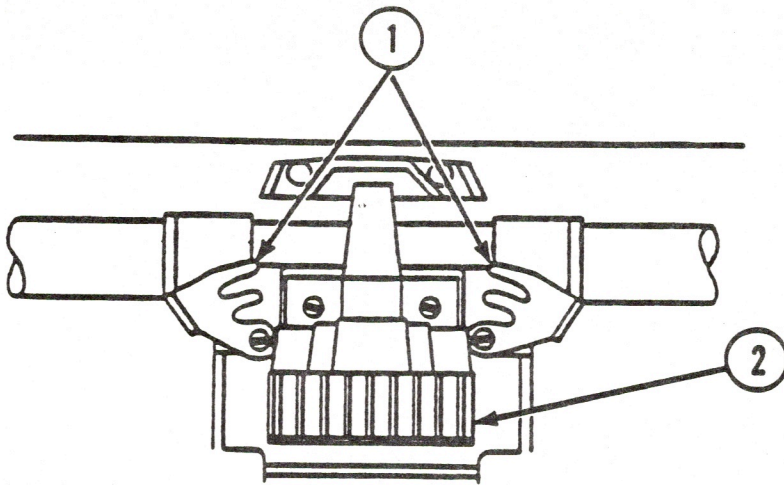


FIGURE 1

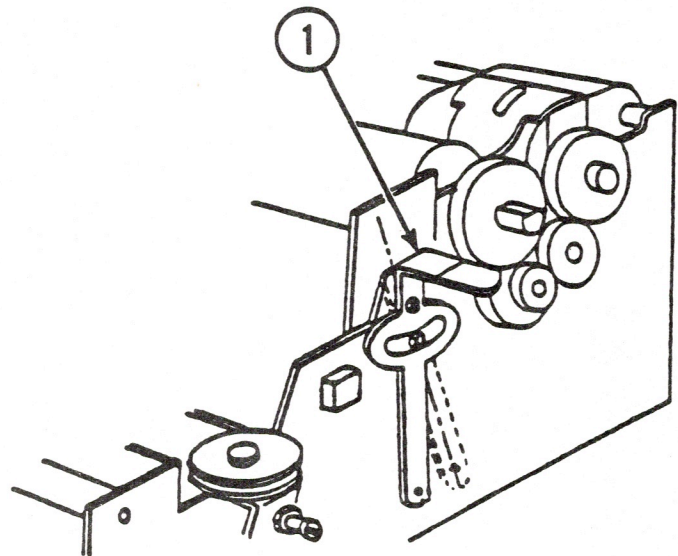


FIGURE 2

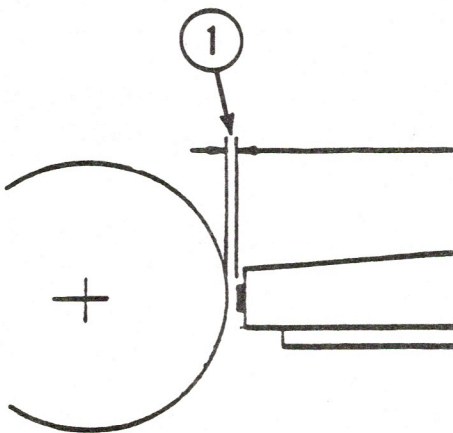


FIGURE 3

#### **D. REMOVE/REPLACE AND ADJUST THE DOT HEAD**

For these procedures you will need:

.06mm feeler gauge

##### **Remove:**

1. Disconnect the power cord.
2. Remove the carrier cover.
3. Remove the ribbon cartridge (Section 1A, page 1.5).
4. To free the dot head, slide out both dot head latches.  
(See Figure 1, #1.)
5. Pull up the dot head. (See Figure 1, #2.) If you have trouble getting it out, pull the paper roller shaft forward. Ease the dot head around the roller shaft.

##### **Replace:**

1. Push in the dot head. If you have trouble getting it in, pull the paper roller shaft forward. Ease the dot head around the roller shaft.
2. To lock the dot head in place, slide in the two dot head set latches.

##### **Adjust:**

1. Push in on the head adjusting lever until it is pointing up. (See Figure 2, #1.)
2. Using a feeler gauge, check that the gap between the head needle and the platen is .06mm or .024 +/- .001 inches. (See Figure 3, #1.) This is the right gap for a single sheet of paper. Try sliding through the platen a single sheet of paper. It should go through with just a little drag.
3. If the gap is off, adjust the head adjusting lever until the gap is correct.



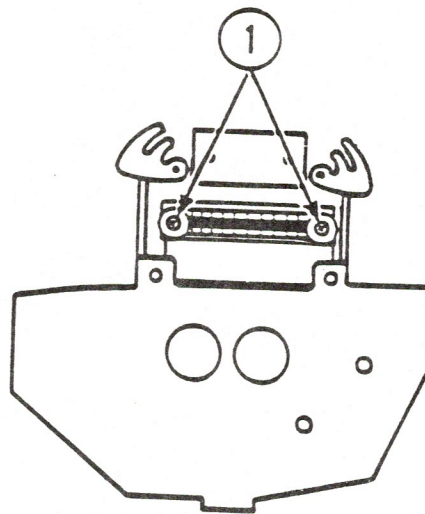


FIGURE 4

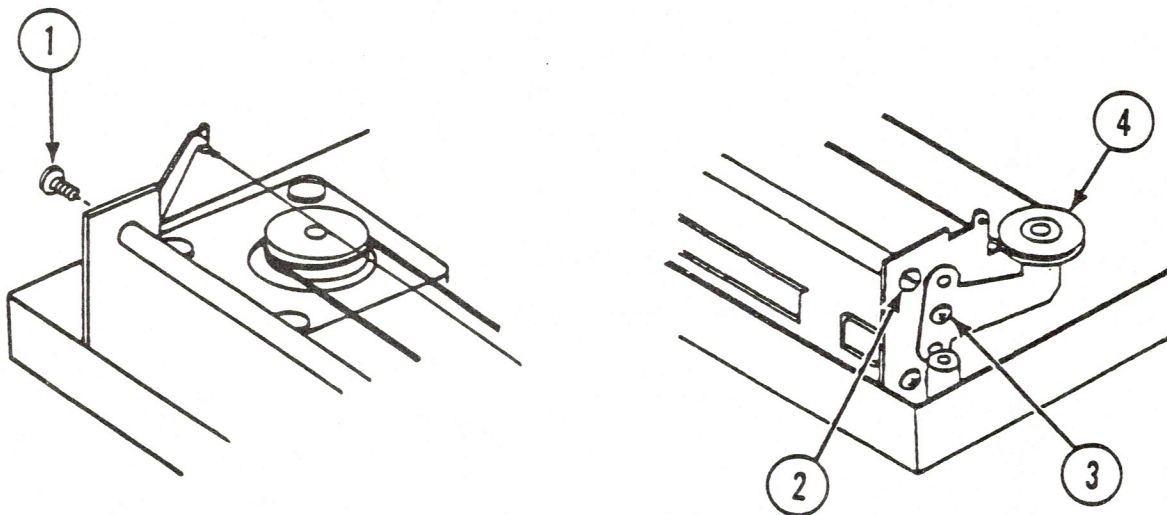


FIGURE 5

## **E. REMOVE/REPLACE THE CARRIER WIRE**

For these procedures you will need:

- Small Phillips screwdriver
- Small flat blade screwdriver
- Needlenose pliers
- Adjustable wrench
- Tension gauge
- Pulley Remover
- Ruler

### **Remove:**

1. Disconnect the power cord.
2. Remove the paper cover, the carrier cover, and the top cover. Set the top cover somewhere out of the way.
3. Remove the dot head (Section 2D, page 2.15).
4. Remove the two screws holding the dot head connector. (See Figure 4, #1.)
5. Lift up the connector and move it out of the way.
6. Free both ends of the ribbon wire. Loop the ends over the carrier and tie them together out of the way.
7. Remove the screw on the left end of the carrier guide shaft (See Figure 5, #1) and set aside the ribbon wire arm.
8. Remove the screw on the right end of the shaft. (See Figure 5, #2.)
9. Pull out the carrier guide shaft.
10. Move the carrier to the right side.



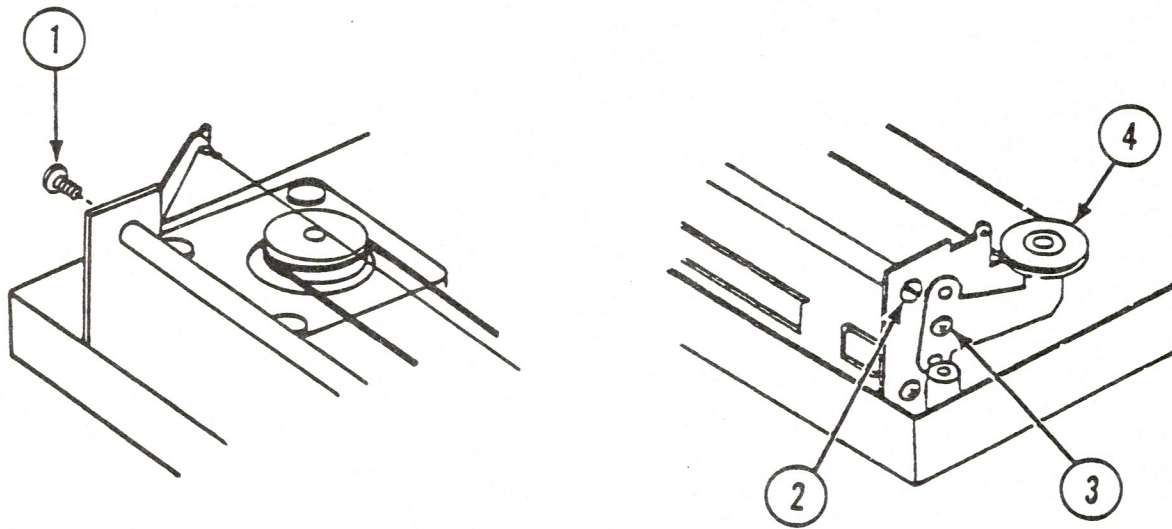


FIGURE 6

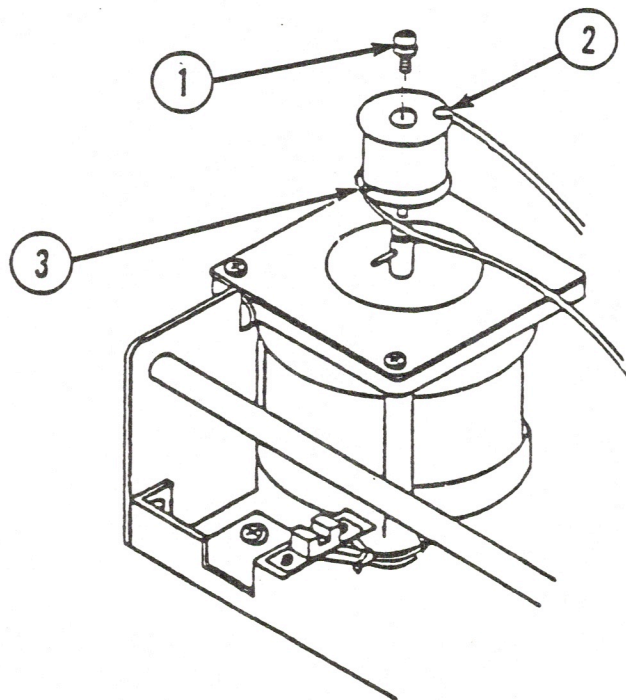


FIGURE 7

11. Use a phillips screwdriver to remove the screw from the top of the motor pulley. (See Figure 7, #1.)

**NOTE:** The pulley can be stopped from turning by holding the carrier in place.

12. Loosen the screw on the tension arm. (See Figure 6, #3.)
13. Slip off the wire from the idler pulley. (See Figure 6, #4.)
14. Remove the top end of the carrier wire. (See Figure 7, #2.)



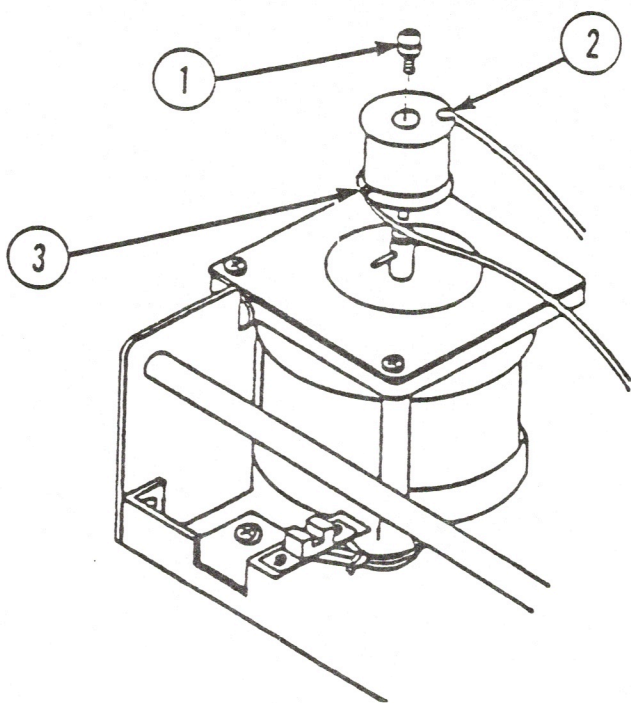


FIGURE 8

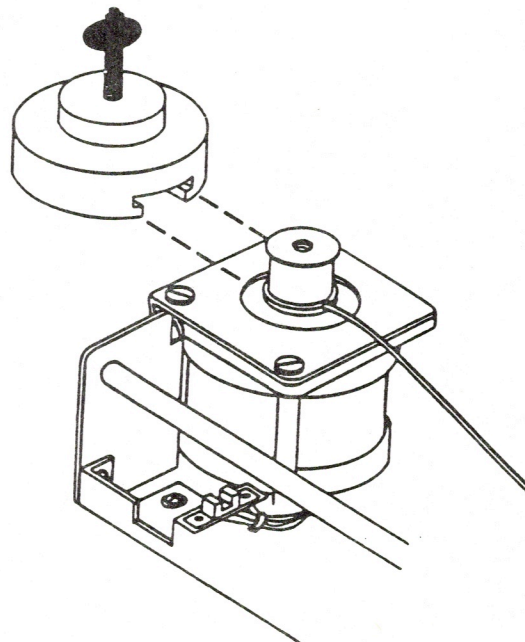


FIGURE 9

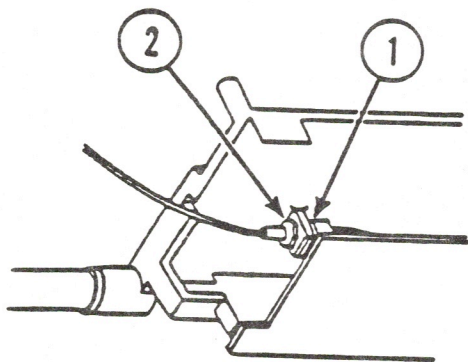


FIGURE 10

15. Use the pulley remover to take off the motor pulley. Slide the pulley remover onto the top of the pulley and turn the screw clockwise until the pulley is free. (See Figure 9.)

**NOTE:** At this time, make sure that two copper shims are on the arms of the motor pulley shaft.

16. Unwind the carrier wire.
17. Remove the bottom end of the carrier wire from the motor pulley. (See Figure 8, #3.)
18. Raise up the carrier.
19. Using an adjustable wrench, hold the nut on the right side of the carrier wire in place. (See Figure 10, #1.) Using a needlenose pliers, remove the wire nut on the left side of the carrier wire. (See Figure 10, #2.)
20. Grab the carrier wire on either side of the black rubber sleeve. Pull out the carrier wire, the nuts, and the sleeve.

**NOTE:** When you remove the carrier wire, first push out the metal shim which is inside, then the wire, the two nuts, and the black rubber sleeve will all come out together. The wire does not slide out of the two nuts. You must pull the wire, the nuts, and the sleeve out of the slot at the bottom of the carrier assembly.

#### **Replace:**

1. Raise up the carrier.
2. Before you insert the new carrier wire, make sure that the long end of the wire runs toward the right side of the printer.
3. Push the black rubber sleeve and metal shim back into the slot at the bottom of the carrier assembly. Tighten the wire nut.
4. Take the long end of the wire and wrap it around the idler pulley. The idler pulley is on the far right side of the printer.
5. Work the long end of the wire under the carrier assembly until it reaches the left side of the printer.



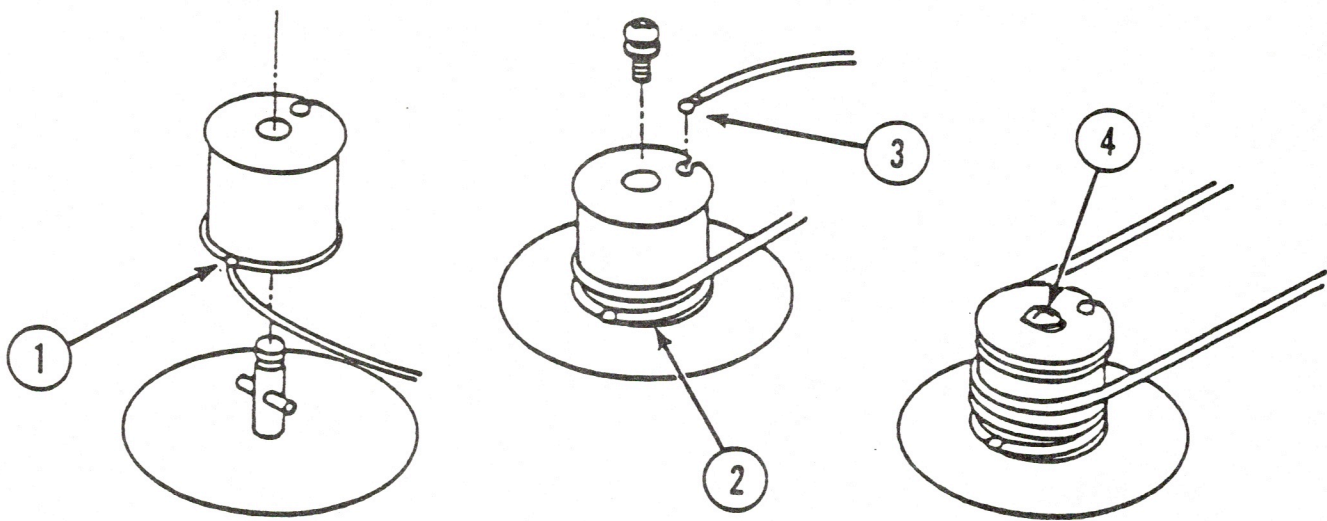


FIGURE 11

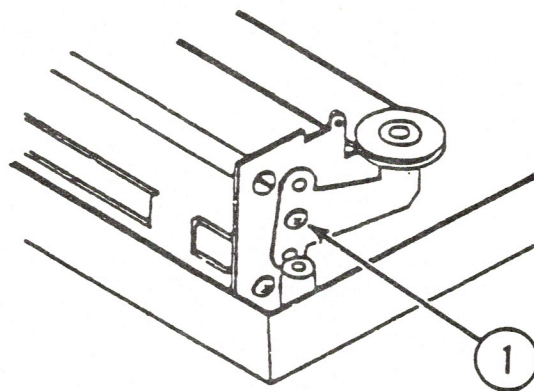


FIGURE 12

6. Insert the long end of the wire into the bottom slot on the motor pulley. (See Figure 11, #1.)
7. Make sure that the two copper shims are still on the arms of the motor pulley shaft.
8. Seat the motor pulley on the shaft. (See Figure 11, #2.)
9. Hold the wire snug against the motor pulley with your thumb. Turn the pulley in a clockwise direction and wind up the carrier wire.
10. Insert the short end of the wire into the top slot of the motor pulley. (See Figure 11, #3.)
11. Wrap the wire around the pulley in a clockwise direction.
12. Replace the motor pulley screw. (See Figure 11, #4.)
13. Replace the front guide rail.
14. Tighten the tension screw until the wire is taut. (See Figure 12, #1.)
15. Replace the two front guide rail screws and ribbon wire arm.
16. Untie the ribbon wire.
17. Attach the right end of the ribbon wire to the ribbon wire post just above the idler pulley.
18. Attach the left end of the ribbon wire to the ribbon wire post just above the motor pulley.

**NOTE:** If the ribbon wire comes off of the ribbon pulley gear, you must put it back on. If you have forgotten how, see Section 2B, page 2.9.



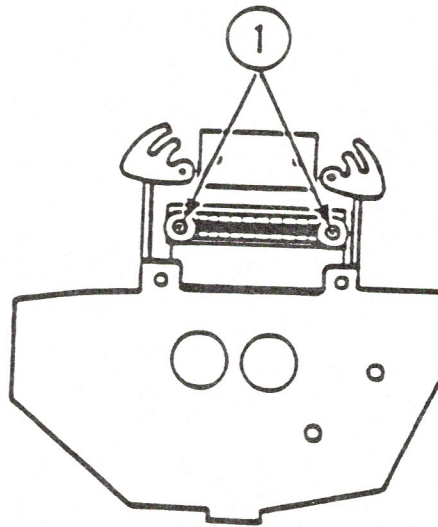


FIGURE 13

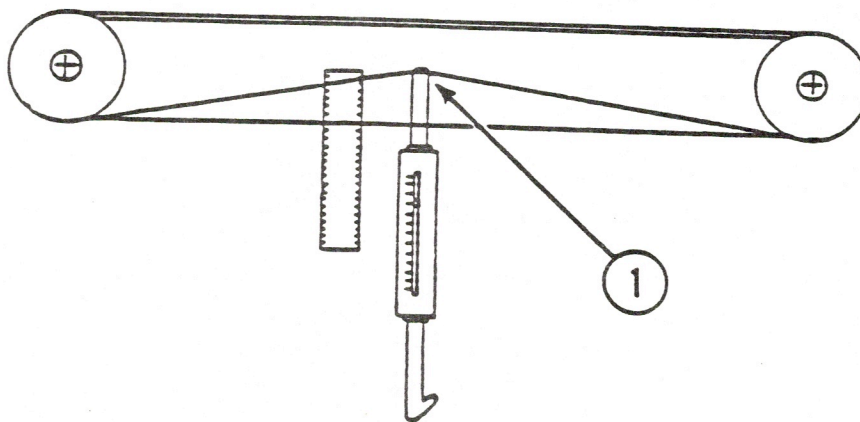


FIGURE 14

19. Replace the dot head connector. (See Figure 13, #1.)
20. Replace the dot head (Section 2D, page 2.15).
21. With the carriage assembly at the far left, push the carrier wire at its center with a tension gauge. (See Figure 14, #1.)
22. When the wire is slackened  $\frac{3}{8}$  of an inch at the center, check the gauge. It should read 1 LB. If it doesn't, adjust the screw of the tension arm.
23. Replace the top cover, the carrier cover, and the paper cover. Load paper and a ribbon cassette.
24. Run the self-test.



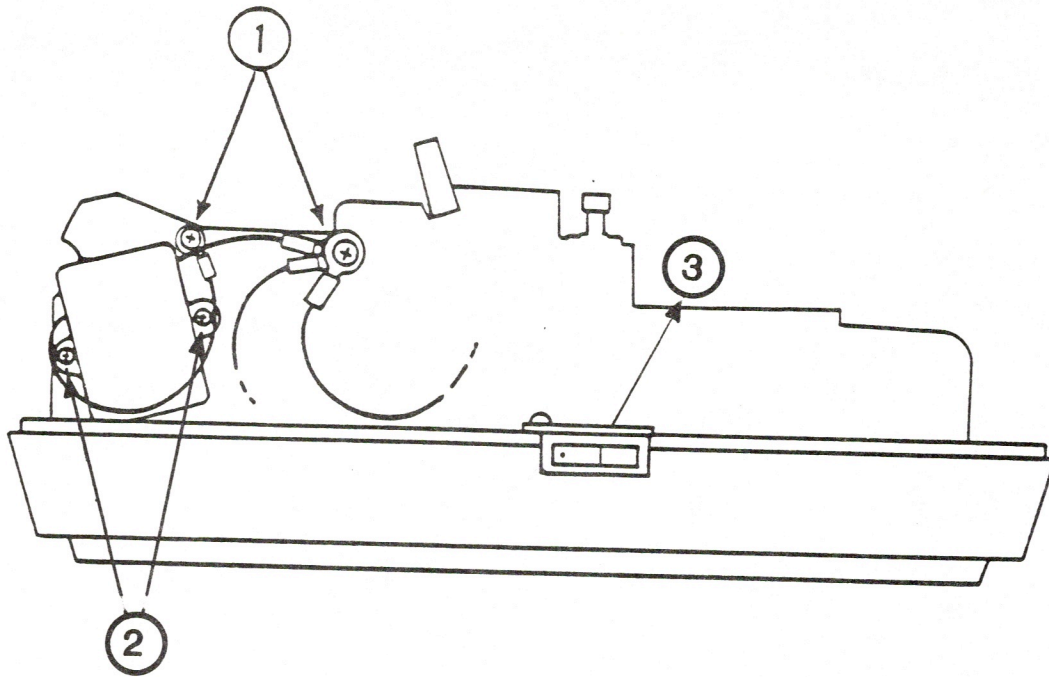


FIGURE 1

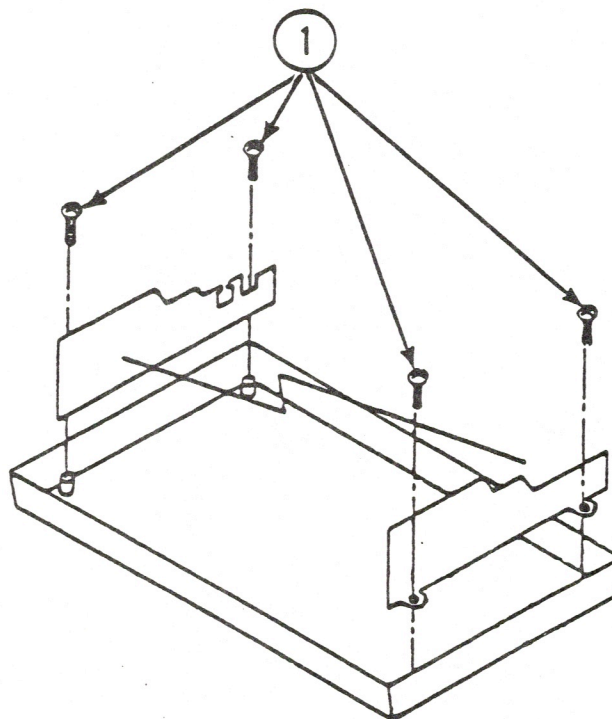


FIGURE 2

## F. REMOVE AND REPLACE THE MECHANICAL ASSEMBLY

For these procedures you will need:

Small phillips screwdriver  
5.5mm Nutdriver  
8mm Nutdriver

### Remove

1. Disconnect the power cord.
2. Remove the paper cover, the carrier cover, and the top cover. Set the top cover down out of the way.
3. Remove the CPU board (Section 2C, page 2.11).
4. Remove the screw and washers holding ground straps to the side frame. (See Figure 1, #1.)
5. Remove the two screws from the noise filter. (See Figure 1, #2.)
6. Gently pull the noise filter away from the frame.
7. Remove screw from plate over power switch. (See Figure 1, #3.)
8. Lift power switch out of its slot.
9. To free the mechanical assembly, remove the four screws holding it to the printer. (See Figure 2, #1.)
10. Lift the mechanical assembly out of the printer.



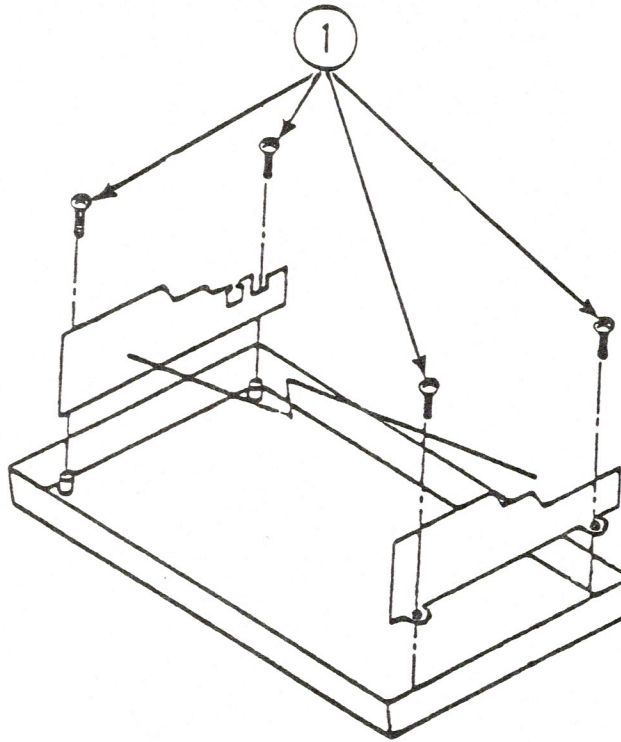


FIGURE 3

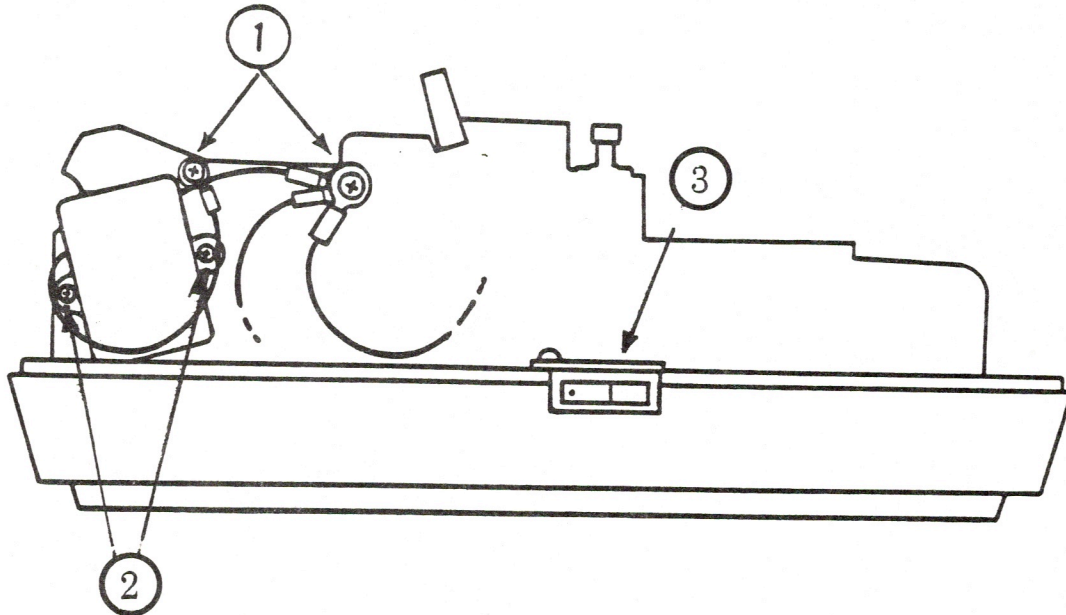


FIGURE 4

## Replace

1. Put mechanical assembly back into the case.
2. Replace the four screws. (See Figure 3, #1.)
3. Position the noise filter on the frame. It goes at an angle (See Figure 4, #1.)
4. Replace the noise filter screws.
5. Put together the screw, washer, three ground cables, and star washer. Screw them into the side frame. Do the same with the fourth ground cable. (See Figure 4, #2.)
6. Put the power switch back into its slot.
7. Replace the plate over the power switch. (See Figure 4, #3.)
8. Replace the CPU board (Section 2C. page 2.13).
9. Replace the top cover, carrier cover, and paper cover.
10. Load paper and ribbon cassette.
11. Power on and perform the self-test.



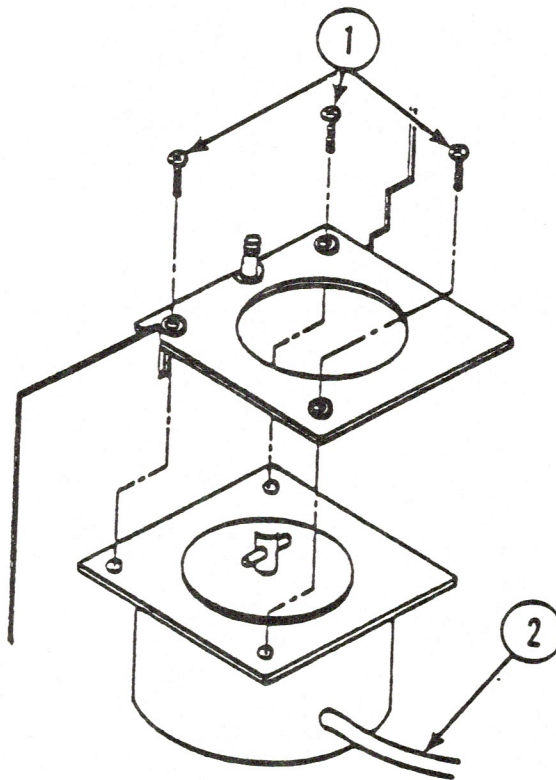


FIGURE 3

## REMOVE AND REPLACE THE CARRIER MOTOR

Medium flat blade screwdriver  
Phillips screwdriver  
Pulley remover

### Remove:

1. Make sure the power is off.
2. Remove the mechanical assembly from the printer.
3. Loosen the ribbon wire tension arm.
4. Free the ribbon wire from the two ribbon wire posts.
5. Tie the wire in a loose knot over the carrier.
6. Remove the motor pulley as you did in Section 2E, page 2.17.
7. Remove the three motor mounting screws. (See Figure 3, #1.)

NOTE: When you remove the last screw, the motor will drop out of the mechanical assembly. As you remove the last screw, hold on to the motor. Carefully note the position of the motor cable. (See Figure 3, #2.) Then let motor fall free.

### Replace:

1. From the front side of the mechanical assembly, put the motor in its slot. Make sure the cable is on the right side of the motor. It should be pointing in the general direction of the idler pulley.
2. Replace the three motor mounting screws. Do not over tighten them.
3. Replace the motor pulley. If you have forgotten how, see Section 2E, page 2.17.
4. Put the motor pulley back on the motor.
5. Replace the motor pulley screw.
6. Untie the ribbon wire.
7. Fix the ribbon wire to the ribbon wire posts.
8. Tighten the ribbon wire arm.



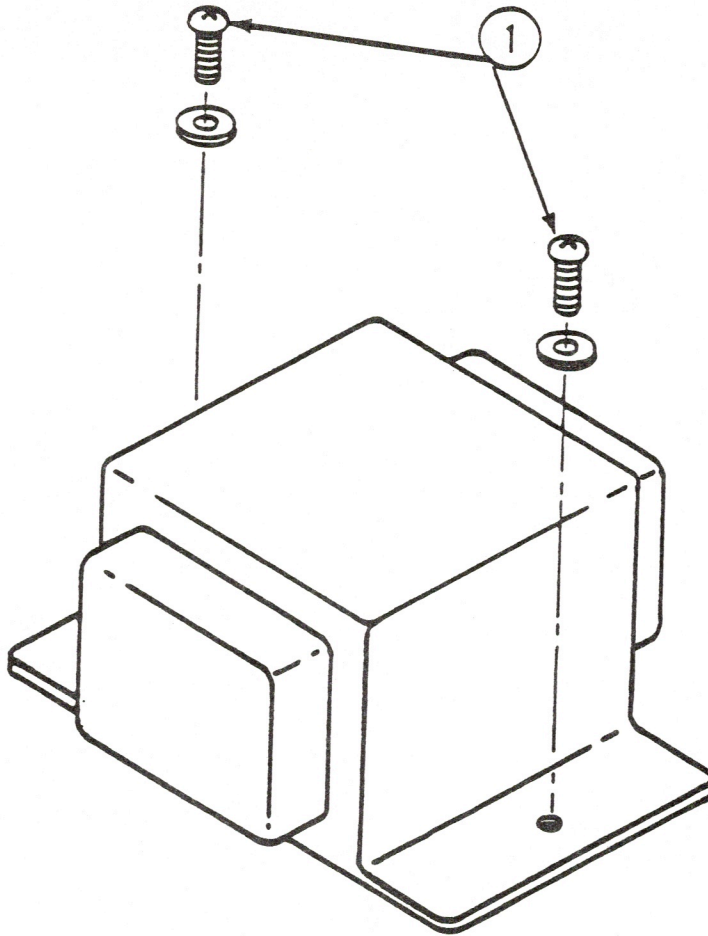


FIGURE 1

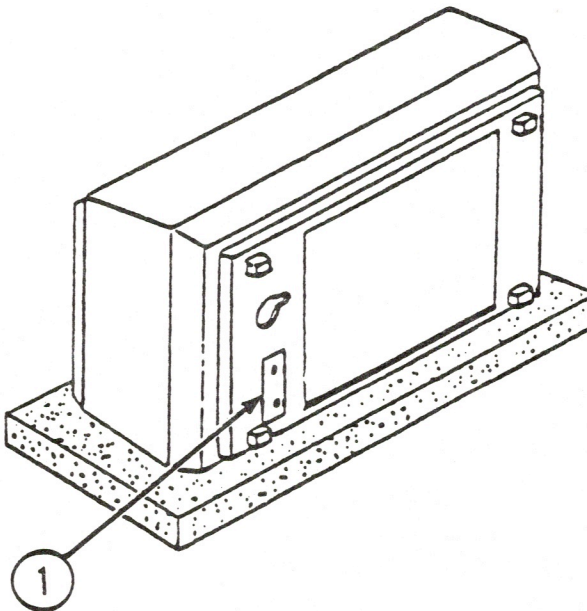


FIGURE 2

#### **H. REMOVE AND REPLACE THE TRANSFORMER**

For these procedures you will need:

Needlenose pliers  
Small Phillips screwdriver

##### **Remove:**

1. Remove the mechanical assembly (Section 2F, 2.27).
2. Remove the two screws from the transformer. (See Figure 1, #1.)

##### **Replace:**

1. Make sure the threaded plate under the bottom of the printer is in position. (See Figure 2, #1.)
2. Put the transformer in place.
3. Screw down the transformer.



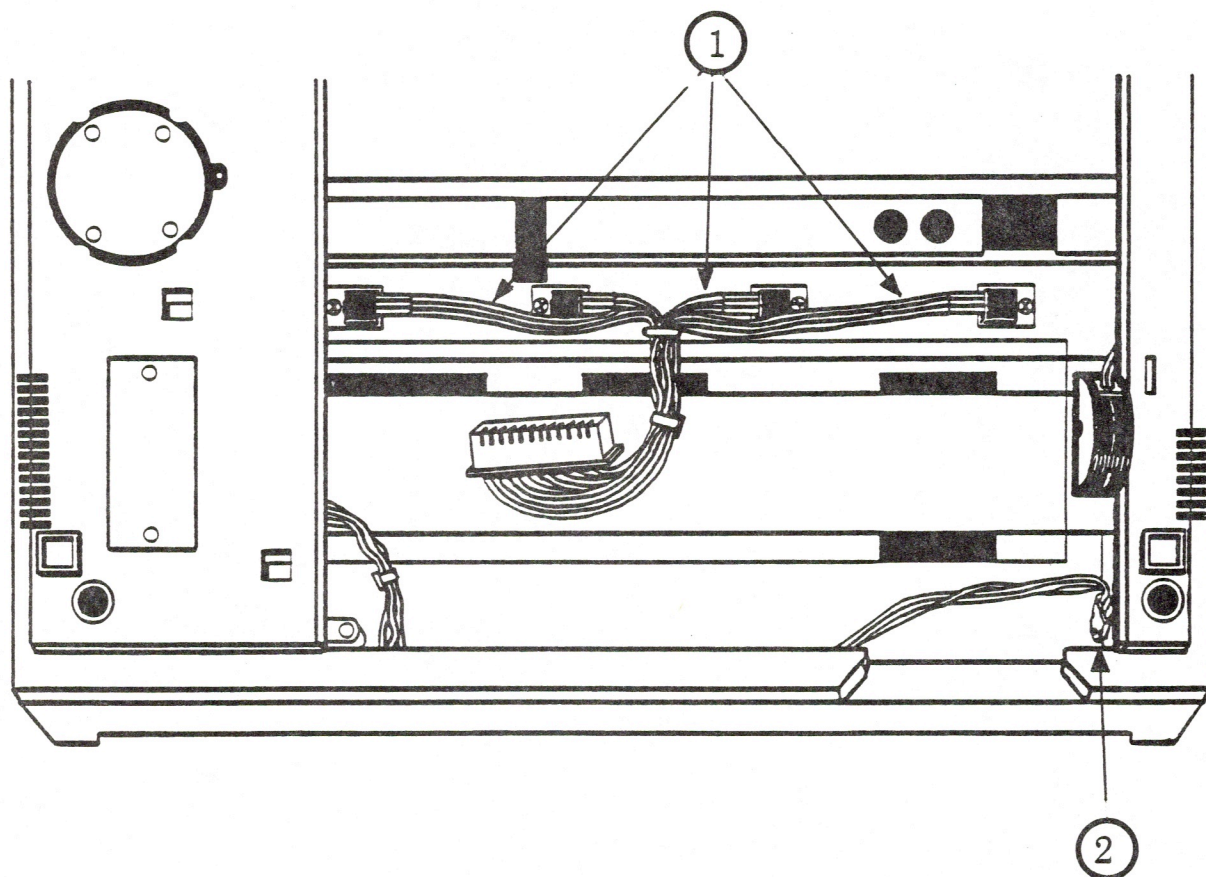


FIGURE 4

## **I. LOCATE THE CARRIER MOTOR DRIVER TRANSISTOR**

1. Remove the mechanical assembly (Section 2F, page 2.27).
2. Turn the mechanical assembly upside down and place it on a protective pad.
3. Note the location of the transistor assembly in Figure 4, #1.

## **J. REMOVE AND REPLACE THE 5V TRANSISTOR ASSEMBLY**

For this procedure you will need:

Heat sink compound  
Phillips head screwdriver

1. Remove the mechanical assembly (Section 2F, page 2.27).
2. Turn the mechanical assembly upside down and place it on a protective pad.
3. Remove the screw from the 5V transistor assembly (Figure 4, #2) and carefully remove the transistor.
4. To replace the 5V transistor assembly, spread a thin layer of heat sink compound on the mechanical assembly. Place the sheet of mylar on top of it. Apply a layer of heat sink compound on top of the mylar, and screw on the transistor.





# **Dot Matrix Printer Technical Procedures**

## **Section 3**

### **Troubleshooting**

#### **Contents:**

Symptom table.....	3.2
--------------------	-----

**NOTE:** The Dot Matrix Printer should be tested with the Apple II Peripherals Diskette. (See **Multi-Product Diagnostics Technical Procedures, Section 1.**)



# SYMPTOM TABLE

SYMPTOM	CORRECTIVE ACTIONS
NO POWER	<ol style="list-style-type: none"> <li>1. Check that the power cord is plugged in.</li> <li>2. Check if the power fuse at the back of the printer is burned out. If it is, replace it and power on again. If the fuse blows a second time, swap components in this order: <ul style="list-style-type: none"> <li>o Regulator transistor</li> <li>o CPU PC board</li> <li>o Carrier Motor</li> <li>o Transformer</li> </ul> </li> <li>3. If the fuse is O.K., you may have a bad power switch. Try replacing it. If that doesn't take care of the problem, swap the Carrier Motor and then the Transformer.</li> </ol>
POWER COMES ON BUT PRINTER WON'T PRINT	<ol style="list-style-type: none"> <li>1. Check if the top cover is seated properly. If it isn't, close it. Then press SEL and try self-test.</li> <li>2. Check if PE lamp is lit on front panel. If it is, reload the paper and try self-test.</li> <li>3. Check the connectors between the carrier and carrier motor and the CPU PC board. If any of the connectors are loose, connect them.</li> <li>4. Try swapping components in this order: <ul style="list-style-type: none"> <li>o CPU PC board</li> <li>o Carrier motor</li> <li>o Transistor assembly</li> </ul> </li> </ol>
PRINTER PASSES SELF-TEST BUT WON'T PRINT UNDER COMPUTER CONTROL	<ol style="list-style-type: none"> <li>1. Check that the computer is properly powered on and initialized.</li> <li>2. Make sure there isn't a software problem.</li> <li>3. Make sure that the interface cable between the printer and the computer is connected at both ends.</li> <li>4. Check if SEL light is on. If it's off, press SEL and try printing under computer control. If it prints while light is off, replace the switch panel.</li> <li>5. Replace CPU PC board.</li> </ol>

# SYMPTOM TABLE

SYMPTOM	CORRECTIVE ACTIONS
PRINT QUALITY PROBLEM: DOTS MISSING	<ol style="list-style-type: none"> <li>1. Make sure dot head is in place.</li> <li>2. Make sure dot head is not clogged with dust or dirt.</li> <li>3. Make sure dot head connector is plugged properly into CPU PC board.</li> <li>4. Make sure gap adjustment lever is set properly.</li> <li>5. Try replacing components in this order:               <ul style="list-style-type: none"> <li>o Dot head</li> <li>o CPU PC board</li> </ul> </li> </ol>
PRINT QUALITY PROBLEM: PRINTING TOO LIGHT	<ol style="list-style-type: none"> <li>1. Check if ribbon is old, torn, frayed, or twisted.</li> <li>2. Check if ribbon wire tension is too loose and adjust as necessary.</li> <li>3. Check if gap adjustment lever is set properly.</li> <li>4. Adjust intensity pot. To do this, lift the clear plastic sheet that covers the configuration switches. Locate VR2 IMPRES. Insert a screwdriver into the slot on VR2. Turn the screwdriver.</li> <li>5. Try replacing components in this order:               <ul style="list-style-type: none"> <li>o Ribbon cassette</li> <li>o Dot head</li> <li>o CPU PC board</li> </ul> </li> </ol>
PRINT QUALITY PROBLEM: CHARACTERS NOT SPACED PROPERLY	<ol style="list-style-type: none"> <li>1. Check if carrier wire is strung properly.</li> <li>2. Try swapping components in this order               <ul style="list-style-type: none"> <li>o Carrier wire</li> <li>o Carrier motor</li> <li>o CPU PC board</li> </ul> </li> </ol>



SYMPTOM TABLE

SYMPTOM	CORRECTIVE ACTIONS
<p>PRINT QUALITY PROBLEM: CHARACTERS DO NOT ALIGN VERTICALLY BETWEEN ROWS</p>	<p>1. Adjust bidirectional pot. To do this, push back the clear plastic sheet the covers the configuration switches. Locate VR1 ALIGN. Insert a a screwdriver into the slot on VR1. Turn the screwdriver.</p>
<p>CARRIER ASSEMBLY MOVING ERRATICALLY: CARRIER SHAKING, MOVING SLOWLY, OR GIVING OFF BURNING ODOR</p>	<p>1. Try swapping components in this order</p> <ul style="list-style-type: none"> <li>o Carrier motor</li> <li>o Transistor assembly</li> <li>o CPU PC board</li> </ul>

# Dot Matrix Printer Technical Procedures

## Section 4

### Appendix

#### Contents:

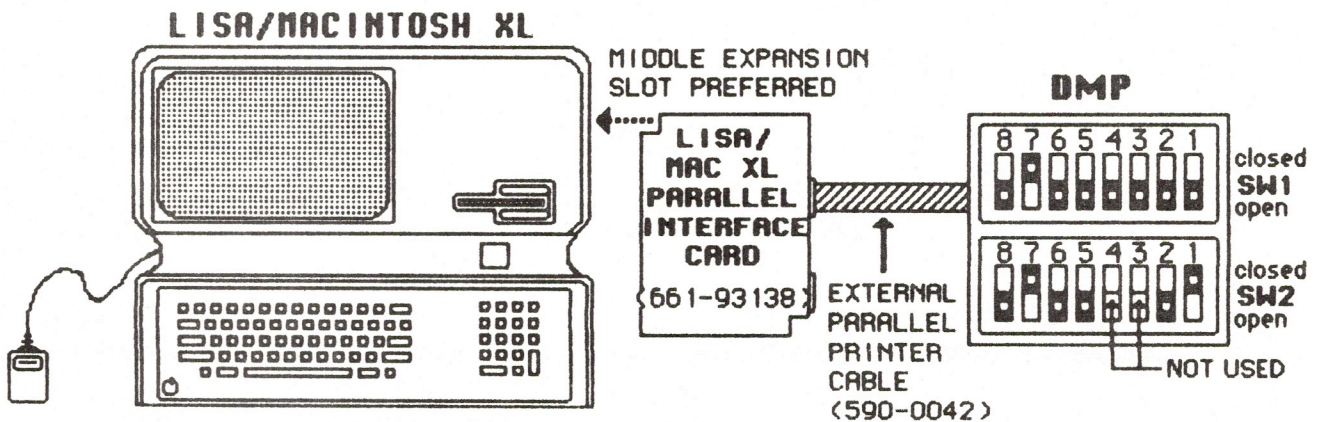
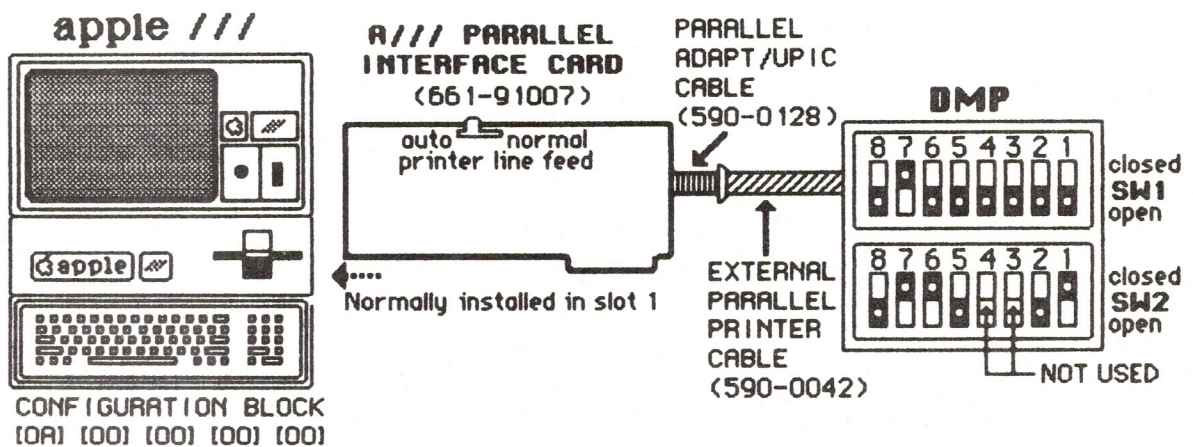
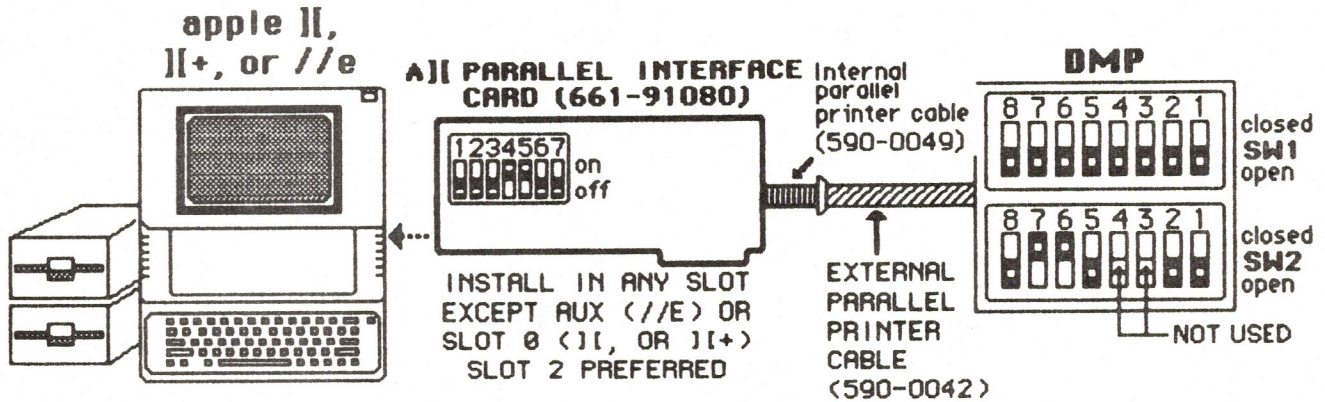
Dot Matrix Printer Configuration.....4.3





# DMP

## DOT MATRIX PRINTER CONFIGURATION



- SWITCH HANDLE OR ROCKER IS IN UP (CLOSED OR ON) POSITION
- SWITCH HANDLE OR ROCKER IS IN DOWN (OPEN OR OFF) POSITION

Apple  
3/85





## Dot Matrix Printer Technical Procedures

### Section 5

#### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Dot Matrix Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

Mechanical Assemblies.....	5.3
Transformer and Power Switch.....	5.3
CPU Card.....	5.3
Transistor Assemblies.....	5.5
Cable.....	5.5
Noise Filter.....	5.5
Other Parts (ImageWriter Parts Cross-Reference).....	5.6



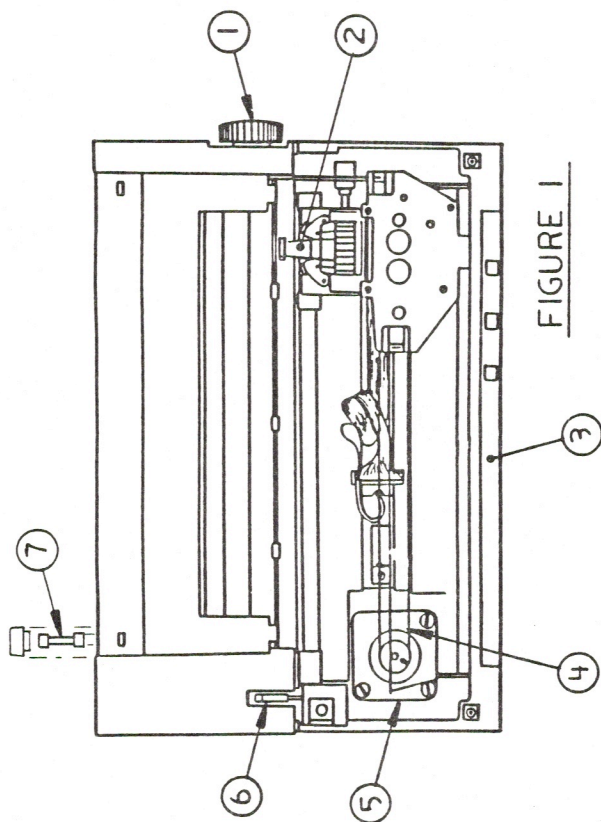


FIGURE 1

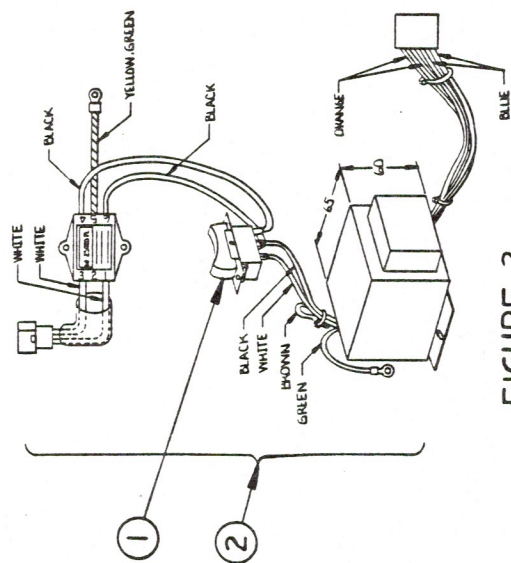
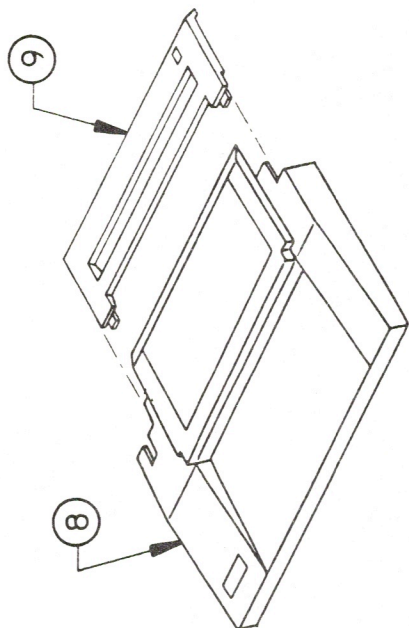


FIGURE 2

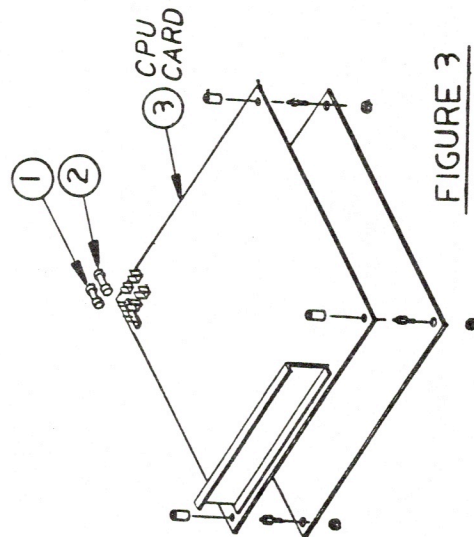


FIGURE 3

**DOT MATRIX PRINTER - MECHANICAL ASSEMBLIES (Figure 1)**

Item	Part No.	Description
1	970-0008	Platen Knob
2	661-0315	Print Head Assembly
3	970-0007	PCB Front Panel w/harness
4	970-0080	Carriage Drive Wire
5	699-0093	Carriage Drive Motor, Complete
6	970-0009	Paper Release Lever
7	740-0101	Fuse, 2 Amp, 3AG
8	970-0078	Carrier Cover, 110V
9	970-0077	Paper Cover

**DOT MATRIX PRINTER - TRANSFORMER AND POWER SWITCH (Figure 2)**

1	970-0011	AC Line Switch, 115V
2	699-0095	Transformer/Switch Assembly

**DOT MATRIX PRINTER - CPU CARD (Figure 3)**

1	740-0022	Fuse, 5 Amp
2	740-0021	Fuse, 3 Amp
3	661-75091	DMP CPU Card



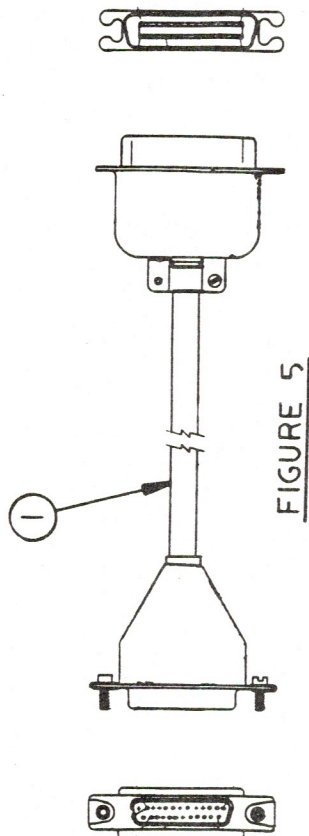


FIGURE 5

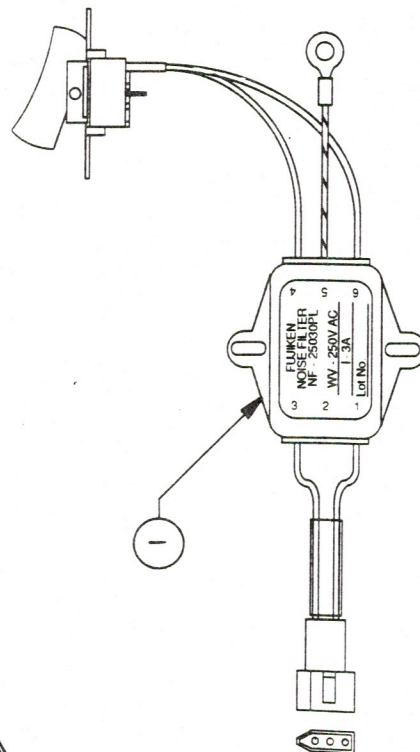


FIGURE 6

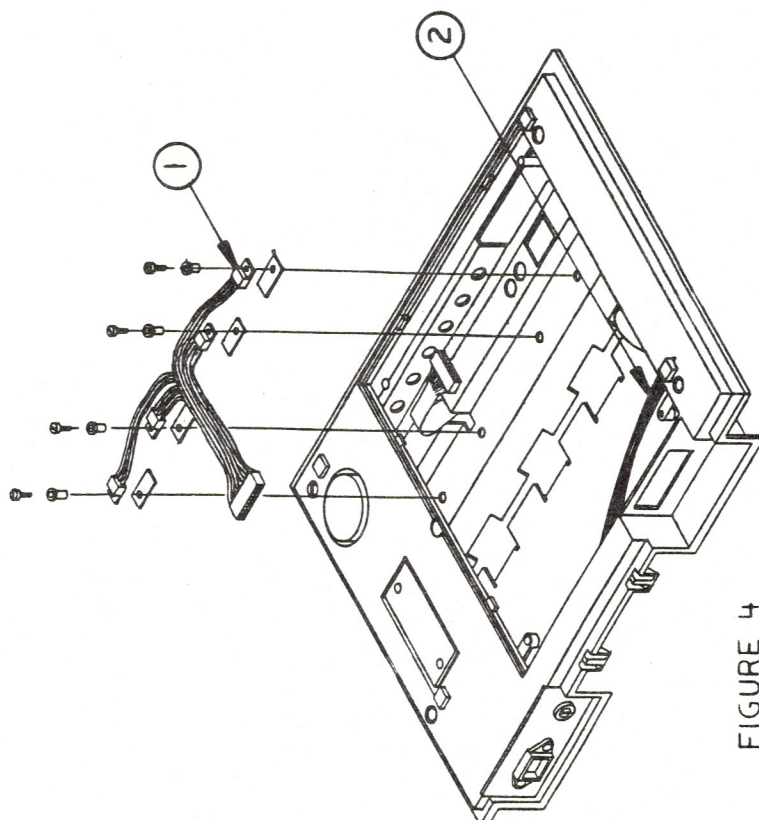


FIGURE 4

**DOT MATRIX PRINTER - TRANSISTOR ASSEMBLIES (Figure 4)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	699-0120	Transistors Assy, Carrier Drive
2	970-0082	Transistor Assembly, 5V

**DOT MATRIX PRINTER - CABLE (Figure 5)**

1	590-0042	Cable, External Parallel Printer
---	----------	----------------------------------

**DOT MATRIX PRINTER - NOISE FILTER (Figure 6)**

1	970-0072	Noise Filter, 110V
---	----------	--------------------



**DOT MATRIX PRINTER - OTHER PARTS  
(ImageWriter Parts Cross-Reference)**

If you need a part that is not listed in the **Dot Matrix Printer Illustrated Parts List**:

1. Find the corresponding part on the **ImageWriter Illustrated Parts List**.
2. Check the list below. If the part is on the list, it can be used for both printers.

Prices for these parts are listed under ImageWriter in the **Service Programs Manual**.

**IMAGEWRITER - MAIN FRAME (Figure 3)**

3	970-0056	Spring, Feed Roller Release
7	970-0082	Transistor Assembly, 5V
10	970-0051	Gear, Idler, Tractor
11	970-0052	Gear, Idler, Platen
12	970-0851	Motor, Paper Feed
15	970-0977	Arm, Paper Bail
16	970-0054	Spring, Paper Bail
30	970-0081	Shim, Motor Shaft
31	970-0053	Pulley, Motor

**IMAGEWRITER - PRINT HEAD ASSEMBLY (Figure 4)**

2	661-0315	Print Head, U.S.
4	970-0059	Guide, Ribbon
5	970-0067	Wiper, Felt
6	970-0842	Bearing, Carrier Assembly
7	970-0827	Retainer, Connector Cable
8	699-0113	Connector Assembly, Head
10	970-0826	Bracket, Connector Holder
11	970-0061	Gear, Ratchet 'A'
12	970-0063	Spring, Ratchet Gear
13	970-0066	Wire, Ribbon Drive
14	970-0844	Wire, Ribbon Drive - 15"
15	970-0064	Spring, Drive Gear

**IMAGEWRITER - PRINT HEAD ASSEMBLY (Figure 4)**  
**(continued)**

Item	Part No.	Description
16	970-0060	Gear, Ribbon Drive
17	970-0062	Gear, Ratchet 'B'
18	970-0825	Arm, Ribbon Drive Wire
19	970-0875	Screw, Shoulder
20	970-0065	Gear, Change Arm
21	970-0719	Screw, Shoulder

**IMAGEWRITER - PAPER TRACTOR FEED ASSEMBLY (Figure 5)**

4	970-0057	Gear, Tractor Feed
5	970-0058	Feed Roller
6	970-0055	Spring, Feed Roller
7	970-0823	Arm, Feed Roller Support
10	970-0834	Cam, Feed Roller Shaft

**IMAGEWRITER - PLATEN CARRIER DRIVE ASSEMBLY (Figure 6)**

3	970-0069	Gear, Platen
5	970-0070	Arm, Carrier Wire Tension
7	970-0080	Wire, Carrier
9	970-0068	Platen Core, Rubber
12	970-0982	Cradle, Platen Guide

**IMAGEWRITER - BOTTOM VIEW (Figure 7)**

1	860-0034	Washer, Shoulder Nylon
2	725-0006	Insulator, Silicon Rubber
5	970-0824	Plate, Transformer Cover
6	699-0120	Transistor Assembly, Carrier Drive



**End of Dot Matrix Printer  
Section Start of Daisy  
Wheel Printer Section**

# APPLE DAISY WHEEL PRINTER TECHNICAL PROCEDURES

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# Apple Daisy Wheel Printer Technical Procedures

## Section 1

### Basics

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## HOW TO USE THIS MANUAL

If you have not worked on an Apple Daisy Wheel Printer (DWP) before --

Read and perform this section, **Basics**, before you do anything else. It will familiarize you with the basic parts and operation of the printer, show you how to run the printer self-tests, and help you perform all the other tasks more quickly.

You can use **Sections 3 and 4, Take-Apart and Print Quality Adjustments**, as a self-training course, by going through the procedures in order on a printer of your own. Or you can simply use the step-by-step instructions when you need them. However, since the DWP is a complicated mechanism, it's a good idea to practice the procedures before you need to use them.

If you are already familiar with the DWP --

Use **Section 2, Troubleshooting**, as a guide to repairs. The symptom table at the front of **Troubleshooting** lists the general categories of possible problems, and refers you to the appropriate Troubleshooting Table. The Tables tell you how to isolate and repair specific faults.

**Sections 3 and 4, Take-Apart and Print Quality Adjustments**, contain step-by-step instructions for the adjustments and replacements recommended by the Troubleshooting Tables. To find a particular procedure, just use the table of contents of the appropriate section.

**Preventive Maintenance** procedures (cleaning and lubrication) are given in section 5. Sections 6 and 7 contain technical procedures for the **Forms Tractor** and **Sheet Feeder** attachments for the DWP.

The **Illustrated Parts List**, contains exploded diagrams of the DWP modules, along with part numbers of the piece parts available from Apple. All these piece repairs are optional at Level One, but if you choose to replace broken or worn-out parts in your shop, this section will be helpful.

To begin learning how to operate the DWP, turn the page.



## TOOLS AND MATERIALS NEEDED:

**NOTE:** There have been several revisions of the main PCB and a number of minor mechanical changes (size or type of screws, nuts, etc.) since the DWP was introduced. The tools recommended here should cover most DWPs currently in the field, but do not be surprised if you find variations from printer to printer.

Screwdrivers:	Small flatblade Medium flatblade with narrow head (magnetized) Medium Phillips Small Phillips
Nut drivers:	1/4 inch 5/16 inch
Wrenches:	5/8 inch open-end 1/4 inch box and open-end 11/32 inch box and open-end 5/16 inch box and open-end 3/16 inch box and open-end
Miscellaneous:	0.072 inch six-flute spline wrench 0.001 to .003 inch feeler gauges Needlenose pliers Diagonal cutters Ruler (non-Metric) Crayon or felt marker
Special tools:	Apple Spring Scale and Combination Gauge kit (P/N ) Apple Combination Gauge (Apple P/N ) <b>Torx Screwdriver*</b>

\* **NOTE:** This Torx driver, used for platen adjustments, is available at this time (10/83) only from the manufacturer and its representatives.

For information, current prices, and local distributors, write or call:

Mountz, Inc.  
1080 North 11 St.  
San Jose, CA 95112  
(408) 292-2214

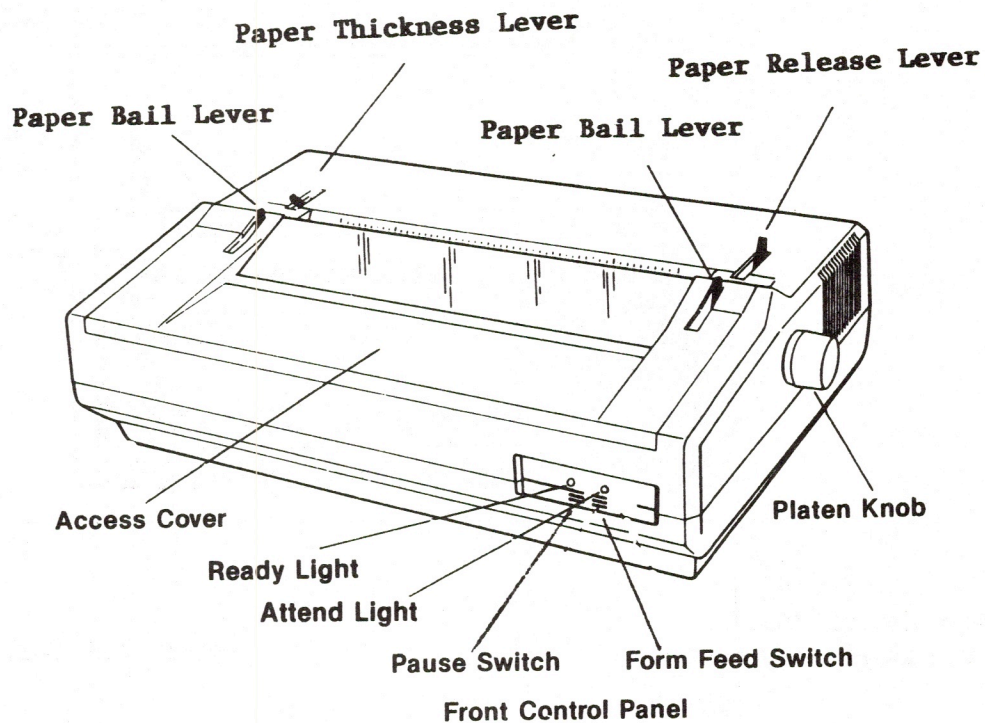
Inquire about **Platen Bit #T15** (P/N 000T15) and **Non-Magnetic Aluminum Shank** (P/N 38958-1).

## PARTS OF THE DAISY WHEEL PRINTER

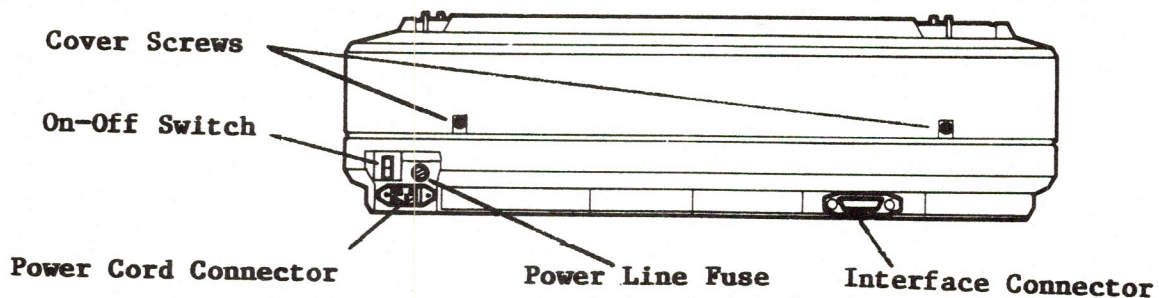
The diagrams on this and the following pages point out the major parts of the DWP and list their names. You can use these diagrams as a guide to the parts referred to in the other sections of this manual.

### 1. The DWP from the Outside

#### Front:

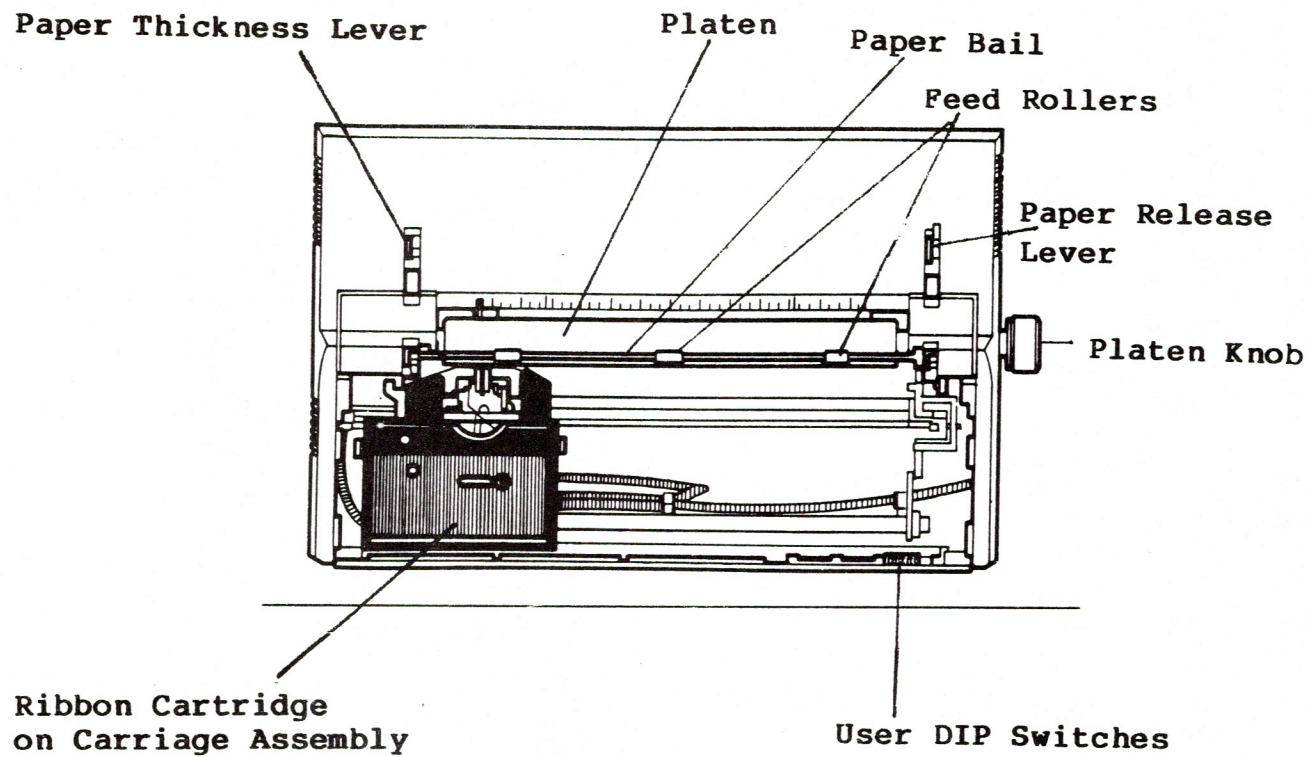


#### Back:

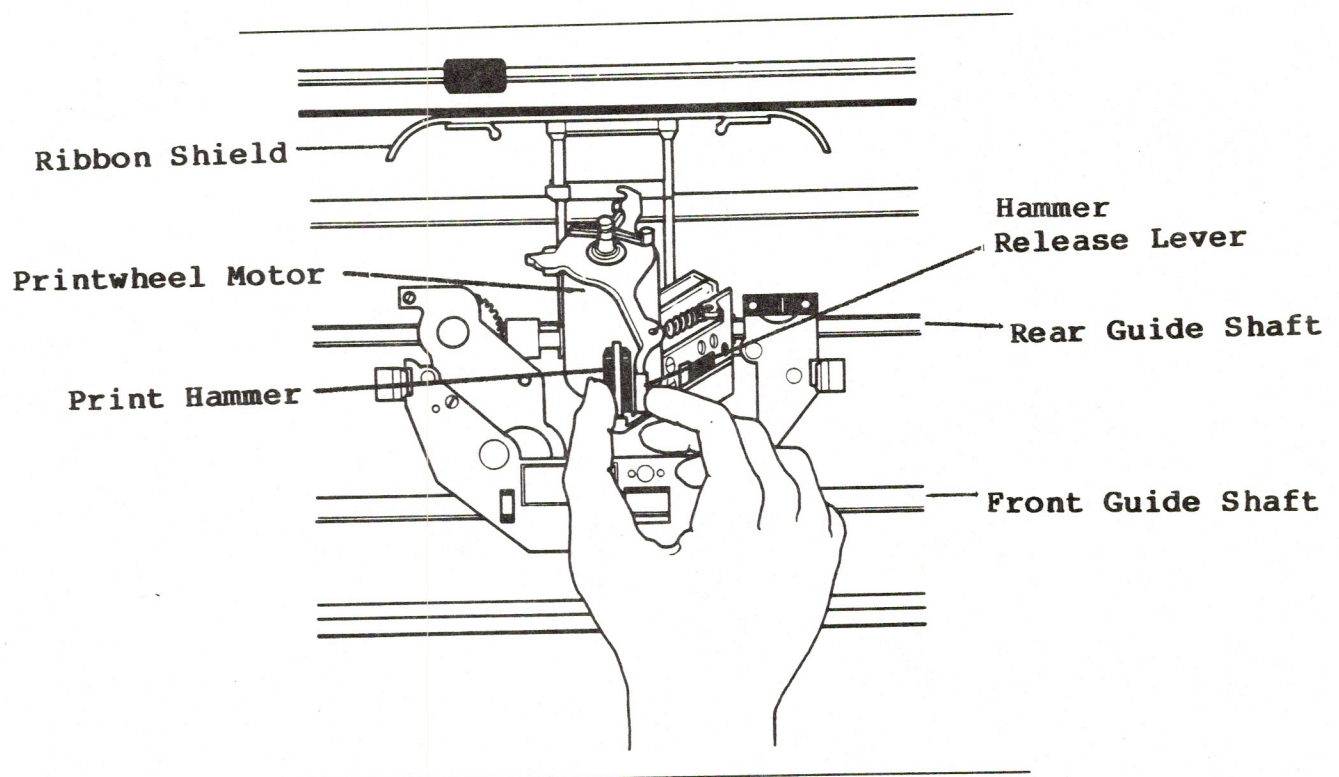




## 2. The DWP with the Access Panel Removed



### 3. The Carriage Assembly (with Ribbon Cartridge Removed)





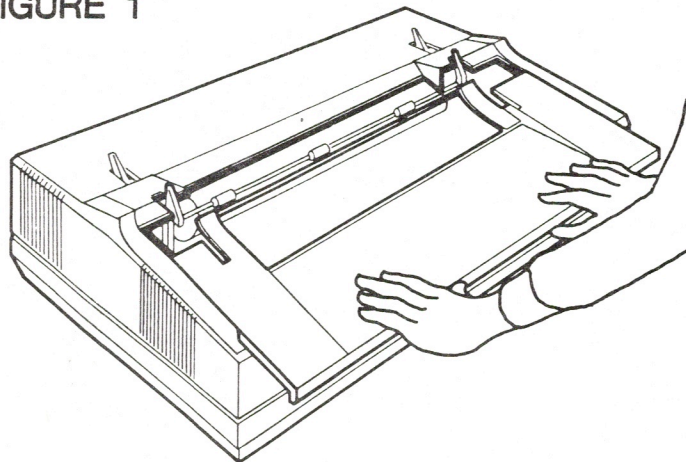
## BASIC USER TASKS

### Removing the Access Panel

This enables you to reach the printwheel, ribbon cartridge, and user switches.

1. Grasp the front lip of the panel and slide it forward (see Figure 1).
2. Tilt the front of the access panel down so you can see the small hinges on its back side. (With the panel in a vertical position, the hinges hold the panel to the front frame.)
3. To remove the access panel completely, lift it off its hinges.

FIGURE 1



### Other User Tasks

Refer to the **DWP User's Manual, Part 1**, for instructions on removing and replacing the ribbon cartridge and printwheel, loading paper, and setting "top of form" position.

**IF YOU ARE PERFORMING THESE PROCEDURES FOR PRACTICE, REMOVE AND REPLACE THE PRINTWHEEL AND RIBBON CARTRIDGE, LOAD PAPER, AND SET TOP OF FORM BEFORE PROCEEDING FURTHER.**

## Replacing the Access Panel

1. Hang the panel, by its hook-shaped plastic hinges, from the front of the printer case.
2. Push the panel forward so that it is level, and gently slide it toward the back of the printer until it is completely closed.

## Checking Operation

When you turn the printer on, check the two **status lights** on the front panel. You should see one of the following four conditions:

**Ready light** steady, **attend light** off: the printer is ready.

**Ready light** blinks, **attend light** off: the printer is in "pause" mode. Press the PAUSE switch and the ready light should become steady.

**Ready light** blinks, **attend light** on: normally indicates that access panel is off, or ribbon has run out, or no paper is installed in printer. Check for these conditions, correct if necessary, then press PAUSE. If lights remain in this condition, see **Troubleshooting** section.

**Ready light** off, **attend light** steady: the printer needs attention. Refer to the **Troubleshooting** section.

If no lights come on, see the **Troubleshooting** section.



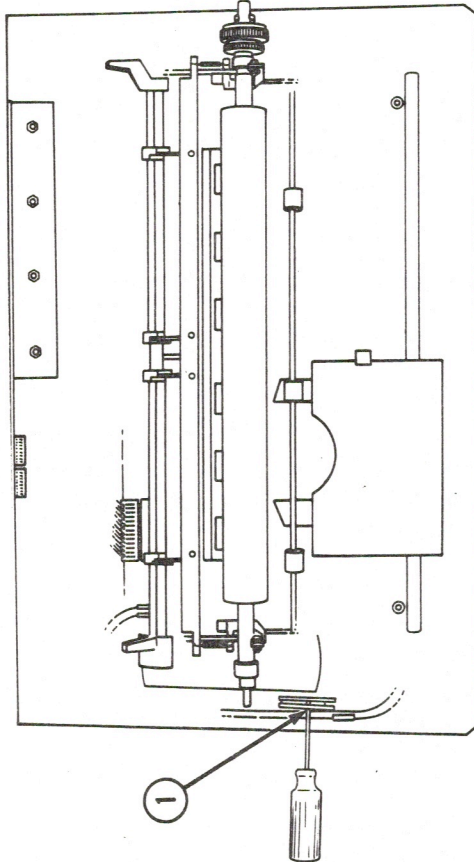


FIGURE 2

Software Version 1.6

DIP Switch 1: 11100100      DIP Switch 2: 10010000      DIP Switch Front Panel: 00100001      1 = CLOSED      0 = OPEN

Internal loop back test PASSED

! "#\$%&'()\*+,-./0123456789;<=>?@ABCDEF GHI JK LMNOPQRSTU VWXYZ[ \ ] ^ \_`a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ÿ

### FIGURE 3

## PRINTER DIAGNOSTICS - SELF-TESTS

There are three self-tests (diagnostics) for the DWP: the Terminal Self-Test and Printer Self-Test are used to check mechanical functioning and print quality; the Terminal Self-Test with External Loop Back is used to check the electronics of the main printed circuit board.

**NOTE -- Defeating the Top Cover Interlock Switch:** If you have removed the cover for servicing, the self-tests will not normally run, because of an interlock switch at the front left side of the printer. But you can avoid replacing the cover if you defeat the top cover interlock switch as follows: Find the switch housing on the left side of the printer (Figure 2, #1). Push down on the switch lever inside the housing with a screwdriver, and then insert a small Phillips screwdriver through the hole in the switch housing, to hold the lever down.

**WARNING:** The interlock switch must never be left in the defeated mode. The switch should only be defeated by qualified service personnel during service procedures. **DO NOT DEFEAT THE PURPOSE -- SAFETY -- OF THE INTERLOCK SWITCH.**

### Terminal Self-Test -- Print Quality Check

1. Install paper, 11 inches wide (normal paper installed sideways).
2. Inspect the printwheel and ribbon to make sure that they are not defective or worn.
3. Make sure that the paper thickness lever is in the full forward position (toward the operator).
4. Press and hold the PAUSE switch as you turn on the power.

**NOTE:** If the cover is off, observe the fan: make sure it is not obstructed by cables, etc.

5. Release the switch and the printer will print a short report of switch settings and internal tests, and then all characters on the print wheel. (See Figure 3.)
6. To stop the test you may:

turn power off, or

press and hold the PAUSE switch as the printer nears the end of a line of characters.



### FIGURE 4

7. Inspect the printed characters. All characters, numerals, and symbols should print with equal ink density on their left and right sides, and on top and bottom. The quality of characters should be identical on both sides of the page.
8. If the print quality does not meet these standards, see the **Troubleshooting** section of this manual.

### Printer Self-Test

If you have trouble judging side-to-side print quality with the Terminal Self-Test, the Printer Self-Test prints a "barber pole" pattern (Figure 4) that enables you to see how each character prints at each location on the page. To run that test, follow the procedures for the Terminal Self-Test but press the **Form Feed** switch rather than the PAUSE switch.

### External Loop Back Test

The external loop back test tests the communications circuitry on the main printed circuit board. If the test passes, the board is good; if not, replace the board.

1. Prepare a Serial Loop-back Connector by jumpering (connecting) the following (female-side) sockets on a standard DB25 connector or a modem eliminator cable:  
  
sockets 2 and 3,      4 and 5,      20 and 6,      23 and 8.
2. Connect the male side of the Serial Loop-back Connector to the jack on the back of the printer.
3. To start the test, press the PAUSE button while turning the printer on. To stop the test, press the PAUSE button to stop the printer; then press it again, and the printer will print the contents of its buffer and then stop.

This test produces the same printout as the Terminal Self-test, with two exceptions:

- a) The fourth line printed will indicate whether the external loop back test passed or failed.
- b) The last character printed will be the "status byte," a signal that the printer sends to the host computer (when connected). The status byte tells the host whether the printer is busy or idle, whether Automatic Line Feed is selected or not, etc. For more information, see the Daisy Wheel Printer User's Manual.



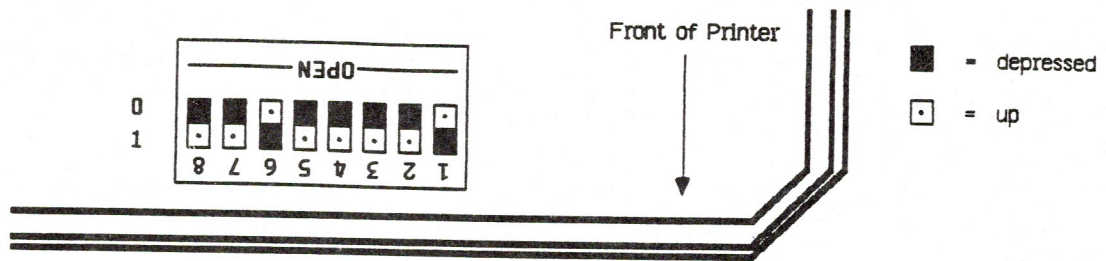


FIGURE 5

Front Panel DIP Switch Configuration							
8	7	6	5	4	3	2	1
1: 8 lines per inch	1: Auto LF after CR	Form Length				Type Pitch	
		0000: 3"	0011: 5½"	0111: 8½"	1001: 11½"	00: 10 cpi	
		0001: 3½"	0100: 6"	1101: 9"	1010: 12"	*01: 12 cpi	
*0: 6 lines per inch	*0: No auto LF after CR	0010: 4"	0101: 7"	1110: 10"	1011: 14"	10: 15 cpi	
		1100: 5"	0110: 8"	*1000: 11"	1111: 16"	11: PS	

1 = CLOSED, 0 = OPEN, \* = factory set

FIGURE 6

## SETUP TASKS

### Setting User Switches

To locate the user-accessible DIP switches, open the access panel and look at the right front corner of the printer. You will see a switch that appears to be installed backwards (see Figure 5). Don't change it: that's the way it should be.

The User DIP Switches control the following functions:

Switch #	Function
8	- Line Feed (6 or 8 lines per inch)
7	- Automatic Linefeed after Carriage Return (on or off)
6-3	- Form Length (from 3 to 16 inches)
2-1	- Type Pitch (10, 12 or 15 characters per inch or proportional spacing).

The printer reads the switches only when it is first turned on; therefore, if you change the switch settings, you must turn the printer off and then on again to make the new settings operational. To change the settings, refer to the "Front Panel DIP Switch Configuration Chart" on the Reference Card in the User's Manual (or Figure 6), and note the following points:

1. The switches can be depressed on either side with a screwdriver or paper clip. Depressing a switch on the side closest to "OPEN" sets a zero value, while the side having the switch numbers (1 through 8) sets a one value.
2. The switch numbers on the chart correspond to the numbers on the switch: both read left to right, even though the switch looks upside down.

For example, the factory settings of the switches are as follows:

	Value	Setting
Line Feed (number of lines per inch)	6	0
Auto LF after carriage return	OFF	0
Form Length	11"	1000
Spacing (characters per inch, "type pitch")	12	01

The numerical setting of the switches is therefore 00100001, and the switch should appear as in Figure 5.

**NOTE:** Some software has commands that will override these switch settings; some does not. If a customer is having problems involving form feed length, type pitch, line feed size, or line feeding, check these switch settings.



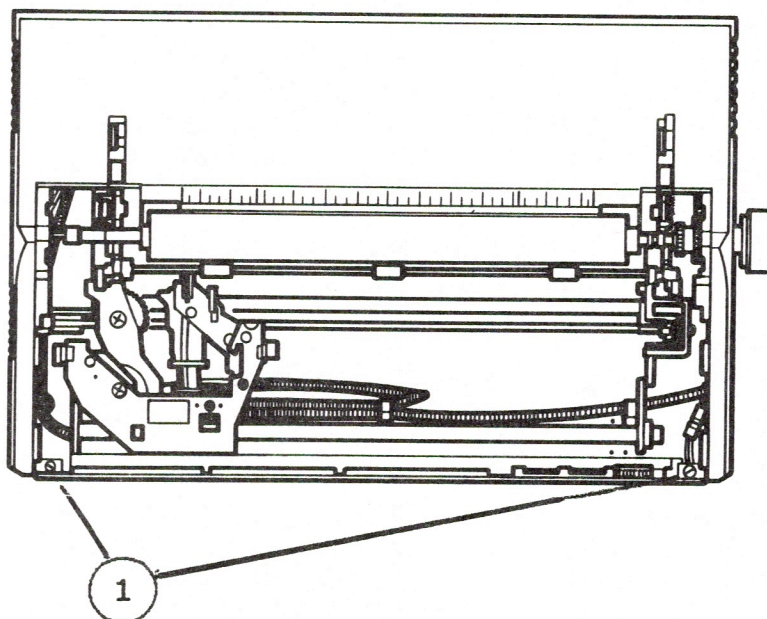


FIGURE 7

## **REMOVE AND REPLACE TOP COVER**

To perform Field Service Maintenance, you often need to remove the top cover. But, since the power supply board is not shielded, always make sure the power is off and the power cord is disconnected before you remove the top cover.

### **Remove:**

1. Turn the printer off and disconnect the power cord.

**WARNING: THE AC POWER CORD MUST BE DISCONNECTED BEFORE THE TOP COVER ASSEMBLY IS REMOVED. LETHAL VOLTAGES ARE PRESENT ON THE POWER SUPPLY PRINTED CIRCUIT BOARD.**

2. Remove the access panel.
3. Remove paper.
4. If you had defeated the cover interlock switch with a paperclip or screwdriver, remove the paper clip or screwdriver.
5. Remove the two screws on the rear of the printer.
6. Loosen completely, but do not remove, the two screws near the front of the printer (one on either side) (Figure 7, #1).
7. Pull off the platen knob.
8. Lift the cover.

### **Replace:**

**NOTE:** If you are doing these procedures for practice, do not replace the cover now, but go to the next procedure.

1. Lower the top cover into place.
2. Tighten the two front retaining screws. Replace and tighten the two rear screws.
3. Return the platen knob.
4. Return the access panel.



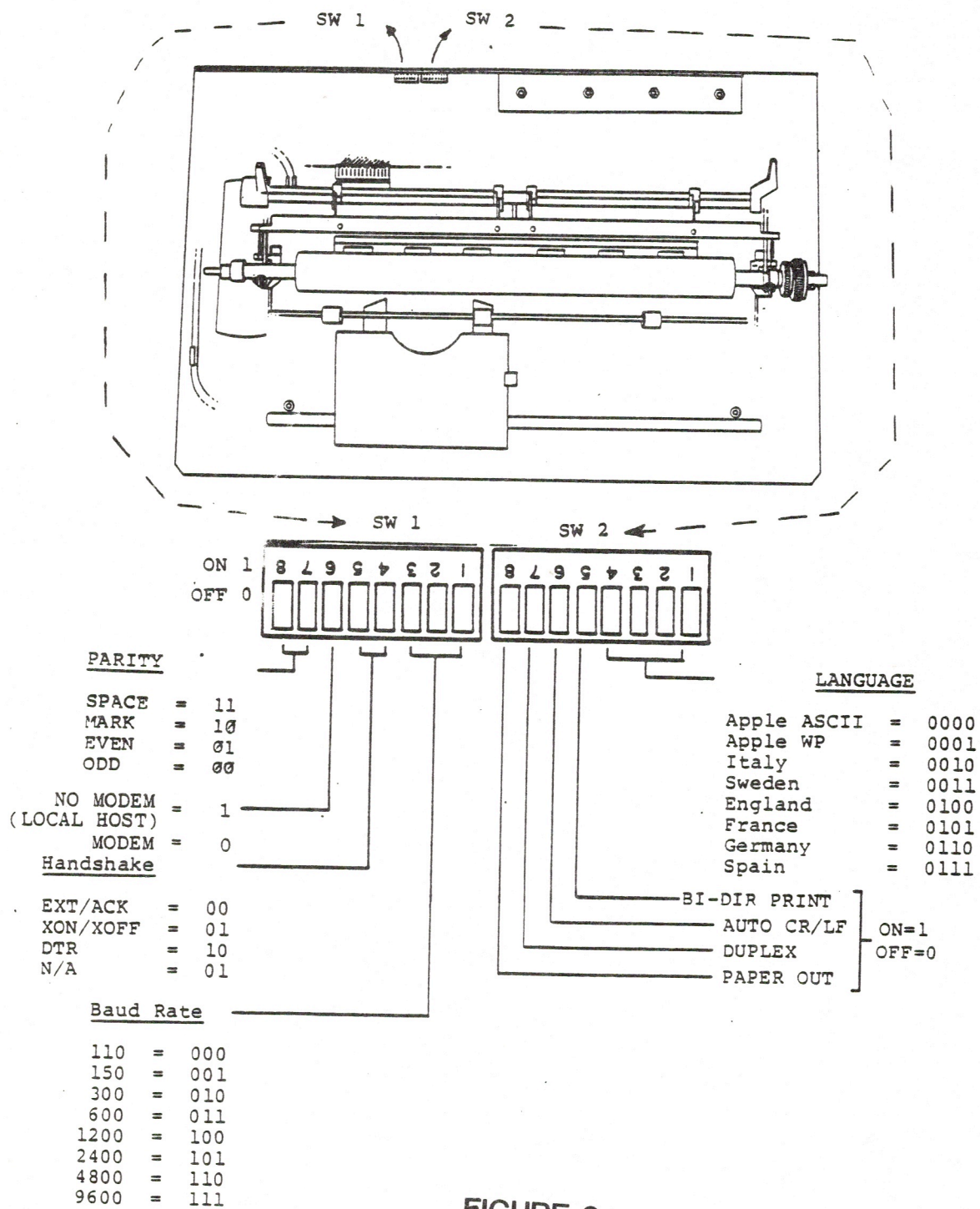


FIGURE 8

## SETTING CONFIGURATION SWITCHES

The two configuration switches are located at the top of the main PCB (see Figure 8). The user is not supposed to set them: as part of an installation, you will set these switches according to the host system specifications and the needs of the customer. Normally the settings will not be changed unless there are technical changes to the host system.

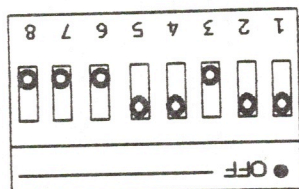
To check the settings, run a Terminal Self-test. The printout will show the switch settings from left to right (switch 8 to switch 1), just as they appear on the physical DIP switches.

1 = ON = switch set toward **rear** of printer  
0 = OFF = switch set toward **front** of printer

If the printout shows that the switches are set incorrectly, remove the top cover and reset them.

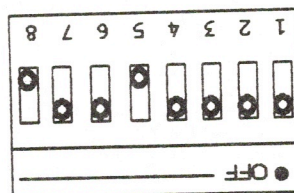
For an Apple II or Apple /// series computer, the settings should be as follows:

DIP Switch 1: 11100100



sw 1

DIP Switch 2: 10010000

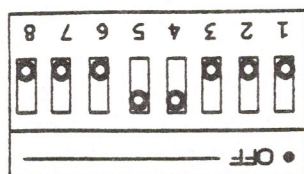


● indicates switch position

sw 2

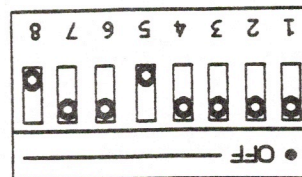
For an Apple Lisa computer, the settings should be as follows:

DIP Switch 1: 11100111



sw 1

DIP Switch 2: 10010000



sw 2



For other computers, you must check the computer's manuals to find the proper values for the functions listed below. Then use Figure 8 to set the switches to those values.

<u>Switch</u>	<u>Function</u>	<u>Value</u>	<u>Setting</u>
sw1: 8-7	Parity		
6	Modem		
5-4	Handshake		
3-1	BAUD rate		
sw2: 8	Paper out		
7	Duplex		
6	Auto Linefeed/ Carriage Ret.		
5	Bidirectional Print		
4-1	Language		

## REPACKING THE PRINTER FOR SHIPPING

The DWP should always be shipped in the same type of packing it came in. Keep a DWP box and packing materials on hand in case you need to send a whole printer to Apple for Level Two service. Follow the repacking instructions in Part 1 of the **Apple Daisy Wheel Printer User's Manual** (new version, to be published in early 1984), or reverse the unpacking instructions in the older **Apple Letter Quality Printer Operator's Guide** (P/N A2L-0066), pages 2-5. In particular, be sure to remove the printwheel, ribbon cartridge, and platen knob; to secure the carriage assembly in place; to tie down the paper bail; and to replace the metal shipping strap on the base of the printer.

THIS IS THE END OF DWP BASICS.

# Apple Daisy Wheel Printer Technical Procedures

## Section 2

### Troubleshooting

#### Contents:

Troubleshooting Tables.....	2.2
Parts List and Diagrams for	
Fuse and Module Replacement.....	2.12

**NOTE:** The Daisy Wheel Printer should be tested with the Apple II Peripherals Diskette. (See **Multi-Product Diagnostics Technical Procedures, Section 1.**)

#### Instructions:

Run a Terminal Self-Test (see **Basics**). Examine the printer for the symptoms listed below, and turn to the appropriate table for instructions. Step-by-step instructions for recommended replacements and adjustments can be found by consulting the tables of contents of the appropriate sections.

Symptom	Table	Page
Poor print quality	1	2.2
Prints scrambled text	2	2.4
Will not print		
Check indicator lamps:		
READY "ON"      ATTEND "OFF"	3	2.5
READY "BLINKS"   ATTEND "ON"	4	2.5
READY "BLINKS"   ATTEND "OFF"	5	2.6
READY "OFF"      ATTEND "ON"	6	2.6
READY "OFF"      ATTEND "OFF"	7	2.7
Paper will not advance	8	2.10
Ribbon will not advance	9	2.11

#### Abbreviations

CA - Carriage Assembly  
CM - Carriage Motor  
PCB - Printed Circuit Board  
PW - Printwheel



**TABLE 1**  
**PRINT QUALITY**

Except where noted, instructions for adjustments are to be found in Section 4, **Print Quality Adjustments**. Refer to the table of contents of the appropriate section to find the page locations of particular procedures.

<b>Symptom</b>	<b>Adjustment</b>
Tops of characters lost or light (evenly across the page)	<ul style="list-style-type: none"> <li>- check ribbon support plate adjustment</li> <li>- hammer angle (raise rear of hammer)</li> <li>- platen height</li> </ul>
Bottoms of characters lost or light (evenly across the page)	<ul style="list-style-type: none"> <li>- move paper thickness lever forward</li> <li>- check ribbon support plate adjustment</li> <li>- hammer angle (lower rear of hammer)</li> <li>- platen height</li> <li>- platen depth</li> </ul>
Print quality poor on one side of the page	<ul style="list-style-type: none"> <li>- platen depth</li> </ul>
Uneven letter spacing (Poor horizontal registration)	<ul style="list-style-type: none"> <li>- drive belt tension (Sec. 3, <b>Take-Apart</b>)</li> <li>- platen locator sleeve</li> </ul>
Uneven line spacing (Poor vertical registration)	<ul style="list-style-type: none"> <li>- If using a forms tractor, check:               <ul style="list-style-type: none"> <li>-installation</li> <li>-paper release lever position</li> <li>-timing belt (see Section 8, <b>Forms Tractor</b>)</li> </ul> </li> <li>- paper feed idler gear</li> </ul>
Missing letters	<ul style="list-style-type: none"> <li>- check printwheel for missing spokes</li> <li>- hammer penetration</li> </ul>

Light printing

- hammer armature  
front & rear stops
- hammer penetration
- replace ribbon
- replace print hammer  
assembly
- replace carriage  
assembly (**Sec. 3,**  
**Take-Apart**)

Messy, over-inked printing

- rear stop
- hammer penetration

Print quality varies from  
character to character,  
line to line

- replace ribbon
- clean ribbon shield  
fingers (**Sec. 5,**  
**Preventive**  
**Maintenance**)
- replace carriage  
assembly (**Sec. 3,**  
**Take-Apart**)

Print quality varies from side  
to side of a single character

- replace ribbon
- clean print hammer  
(**Sec. 5, Preventive**  
**Maintenance**)
- replace print hammer

**NOTE:** Always run a Terminal Self-Test to recheck print quality. Most adjustments will need refinement to achieve optimum print quality.



**TABLE 2**  
**PRINTS SCRAMBLED TEXT**

**Symptom:** Prints scrambled text ("garbage").

**Corrective Action:** Run Terminal Self-Test.

**Result 1: Printing is normal.**

This indicates that the problem is in the host system, host system software, or communications between the host system and printer (User Switches, Configuration Switches).

**Corrective Action:**

- o Check host system software for correct driver, filter.
- o Check software settings for agreement with printwheel.
- o Check User Switch settings (see **Basics** Section).
- o Check Configuration Switch settings (see **Basics** Section).
- o Swap host system.

**Result 2: Prints scrambled text.**

Check the following and correct if necessary, rechecking after each step.

**Corrective Action:**

- o Check printwheel (bent spokes)
- o Check ribbon shield adjustment (may be rubbing against printwheel)
- o Replace Main PCB
- o Replace Carriage Assembly

**TABLE 3**

**Symptom:** Will not print

**Condition:** READY lamp "ON"  
ATTEND lamp "OFF"

This condition shows that the printer should be ready to print.

**Corrective Action:** Check the following and correct if necessary, rechecking status condition:

- Printwheel in place
- Ribbon cartridge OK (try a replacement)
- Configuration Switch settings (see Setup and Configuration section)
- Disable Switches (HAMmer DIS, PW DIS, CA DIS) on main PCB (upper right corner) - should be off (set to right)
- Host system and interface
- Hammer penetration (if hammer fires but no print appears)
- Hammer OK (inspect; try a replacement)

If the DWP still won't print, follow initialization procedure in Table 7, Result 2.

**TABLE 4**

**Symptom:** Will not print

**Condition:** READY lamp "BLINKS"  
ATTEND lamp "ON"

**Corrective Action:** Check the following and correct if necessary, rechecking status condition:

- Shipping straps removed? (see unpacking instructions)
- Access panel secure?
- Top cover secure?
- Out of paper?
- Out of ribbon?
- Cover Interlock Switch wires attached to wrong poles? (See "**Replace Mechanical Assembly**" in **Take-Apart.**)
- If sheet feeder or forms tractor is attached, check out-of-paper switch and adjust if necessary (see **Sheet Feeder** and **Forms Tractor** sections).

If the DWP still won't print, follow initialization procedures in Table 7, Result 2.



**TABLE 5**

**Symptom:** Will not print

**Condition:** READY lamp "BLINKS"  
ATTEND lamp "OFF"

**Corrective  
Action:**

- o Printer is in the "pause" mode. Press the "pause" switch for the READY condition.
- o Replace the main PCB
- o If the DWP still doesn't work, return it to Level Two.

**TABLE 6**

**Symptom:** Will not print

**Condition:** READY lamp "OFF"  
ATTEND lamp "ON"  
Short, audible alarm

**Corrective**

**Action:** Perform the following steps in order, rechecking for condition after each step:

- o Switch power "OFF", then "ON" again
- o Replace main PCB and recheck lamps
- o Replace carriage motor and CM encoder PCB
- o Replace carriage assembly and PW encoder PCB

**TABLE 7**

**Symptom:** Will not print

**Condition:** READY lamp "OFF"  
ATTEND lamp "OFF"

**Corrective**

**Action:** Listen to hear if fan is operating.

**Result 1:** Fan not operating

**Corrective**

**Action:** Perform the following steps in order, rechecking for condition after each step:

- o Check that AC power cord is plugged in.
- o Switch power "OFF", then "ON".
- o Check AC line fuse (see Diagram, p. 2.12).
- o Replace AC power cord.
- o Check power supply PCB fuse (F1) (see Diagram, p. 2.12).
- o Replace power supply PCB.
- o Replace power switch.

**Result 2:** Fan operating

**Corrective**

**Action:** Check printer initialization as follows:

1. Switch power off.
2. Remove top cover and defeat interlock.
3. Push carriage assembly to center of printer.
4. Put slack in ribbon cartridge.
5. Rotate printwheel.

**CONTINUED ON NEXT PAGE**



6. Restore power and watch for one of the following four conditions:

- a. Printwheel rotates - if not, proceed to New Symptom A.
- b. Carriage moves quickly to left side-frame, then slightly right to establish column zero - if not, proceed to New Symptom B.
- c. The ribbon advances slightly to take up slack - if not, proceed to New Symptom C.
- d. If no movement of any carriage assembly component, proceed to New Symptom D.

If carriage, ribbon and printwheel move correctly but printer still will not print, replace main PCB.

**New Symptom:** A - No rotation of printwheel

**Corrective**

**Action:** Perform each of the following steps in order, rechecking for condition after each step:

- o Check PW Disable Switch (Main PCB, upper right corner) - it should be off (set to the right)
- o Check P-9 connection on main PCB
- o Check PW encoder PCB connection
- o Replace PW pico fuse F-2 on main PCB (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage assembly and PW encoder PCB

**New Symptom:** B - No movement of carriage assembly

**Corrective**

**Action:** Perform each of the following steps in order, rechecking for condition after each step:

- o Check CA Disable Switch (main PCB, upper right corner)

- o Check P-7 connector on main PCB
- o Check CM encoder PCB connections
- o Replace pico fuse F-1 on main PCB (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage drive motor and CM encoder PCB

**New Symptom:** C - No movement of ribbon

**Corrective**

**Action:** Perform each of the following steps in order, rechecking for condition after each step:

- o Check the two connectors under the ribbon cartridge on the ribbon support plate for tight connection
- o Replace ribbon cartridge with known good one and recheck
- o Check connector P-9 on main PCB
- o Replace pico fuse F-3 (see Diagram, p. 2.12)
- o Replace main PCB
- o Replace carriage assembly and PW encoder PCB

**New Symptom:** D - No movement of any carriage assembly components

**Corrective**

**Action:** Perform each of the following steps in order, rechecking for condition after each step:

- o Check connector P-8 on main PCB and P-5 on power supply PCB
- o Replace F1 and F2 on power supply PCB (see Diagram, p. 2.12)
- o Replace the main PCB
- o Replace the power supply PCB



**TABLE 8**

**Symptom:** Paper will not advance

**Condition:** READY lamp "ON"  
ATTEND lamp "OFF"  
Carriage assembly operational

**Corrective Action:** Perform the following in order, rechecking for condition after each step:

- o Set user switches correctly.
- o Check connector P-10 on main PCB.
- o Check paper feed idler gear adjustment.
- o Perform Terminal Self-Test.
  - If Pass, problem is host or interface.
  - If Fail, replace pico fuse F-3 on main PCB (see Diagram, p. 2.12).
- o Replace the main PCB.

**Symptom:** Paper advances, but poor vertical registration

**Corrective Action:** Perform the following in order, rechecking for condition after each step:

- o If using a forms tractor, check installation, paper release lever position, and timing belt tension (see Forms Tractor Technical Procedures).
- o Adjust the paper feed idler gear.

**Symptom:** Paper advances backwards or with chatter

**Corrective Action:** Perform the following in order, rechecking for condition after each step:

- o Check the paper feed idler gear for chatter as gears mesh.
- o Check P-10 on the main PCB; it could be backwards or seated on the wrong pins.
- o Replace the main PCB.

TABLE 9

**Symptom:** Ribbon will not advance  
Printwheel motor and carriage drive motor  
operational

**Corrective  
Action:**

- o Remove ribbon and initialize to see if ribbon motor is operational.
- o If operational, replace ribbon cartridge and perform Terminal Self-test
- o If non-operational, perform the following, rechecking condition after each step:
  - Replace pico fuse F-3 on the main PCB (see Diagram, p. 2.12)
  - Replace the carriage assembly.



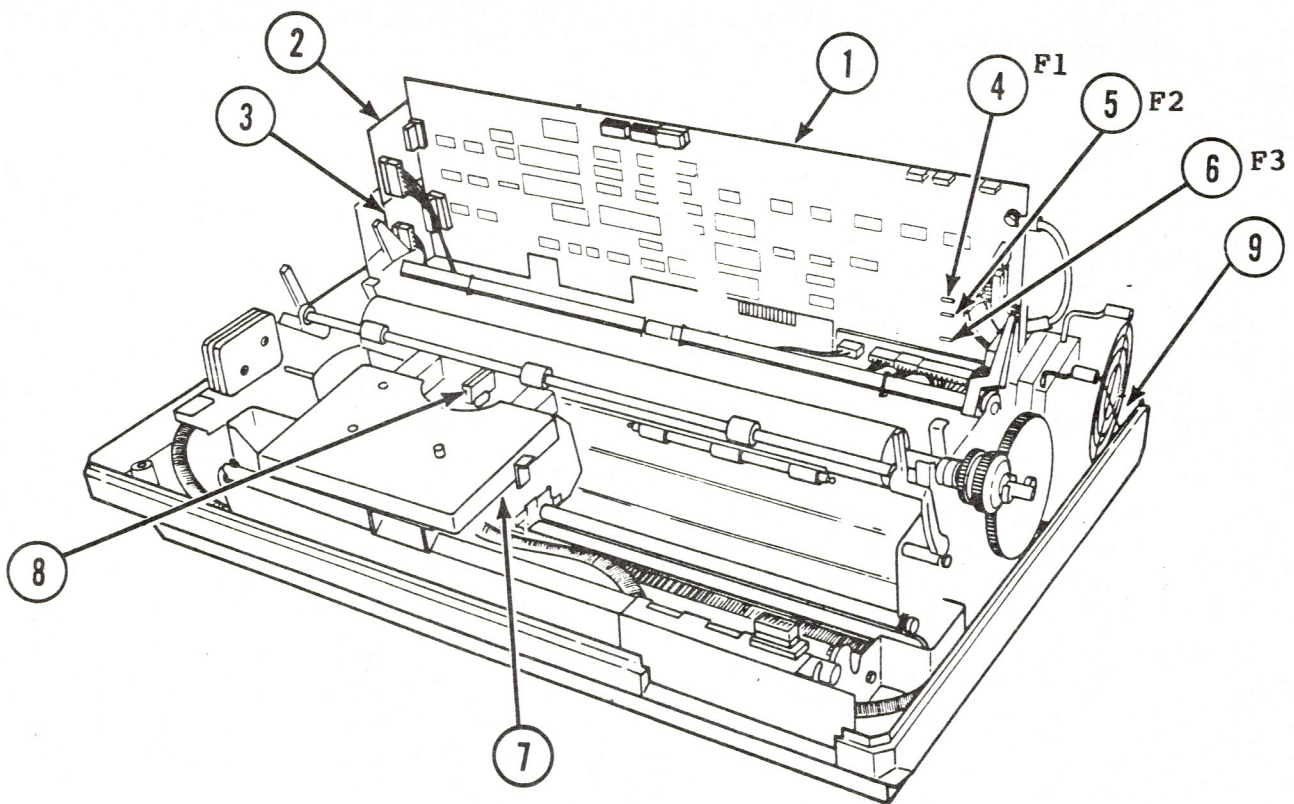


FIGURE 1

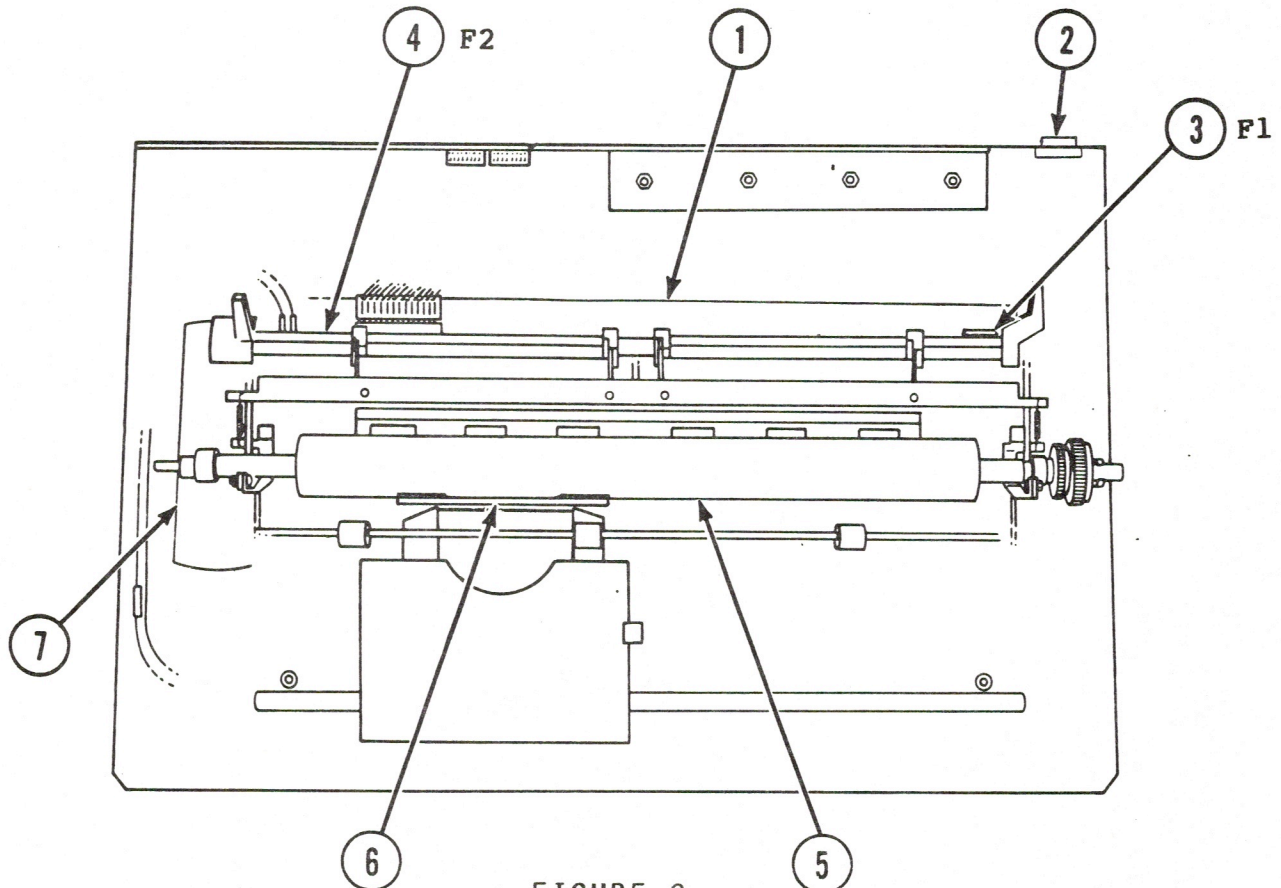


FIGURE 2

## PARTS LIST AND DIAGRAMS FOR MODULE AND FUSE REPLACEMENT

For a complete listing of replaceable parts, see **Section 8, Illustrated Parts List**. The parts listed below are the recommended module replacements for Level One service. The other parts listed in the **Illustrated Parts List** are optional replacements.

### Fuses

AC Line Fuse	- 5 amp (Figure 2, #2)
Power Supply PCB Fuses	- F1, 5 amp or, in Europe, JP1, 3 amp (Figure 2, #3) - F2, 5 amp (Figure 2, #4)
Main PCB Pico Fuses	- F1, 4 amp (Figure 1, #4) - F2, 2 amp (Figure 1, #5) - F3, 5 amp (Figure 1, #6)

### Mechanical Components

Mechanical Assembly	Figure 1: everything except printed circuit boards and outer case
Carriage Assembly	Figure 1, #7
Print Hammer Assembly	Figure 1, #8
Carriage Drive Motor	Figure 2, #7
Power Switch	Figure 2, #2
Platen	Figure 2, #5
Ribbon Shield	Figure 2, #6

### Printed Circuit Boards

Main PCB	Figure 1, #1
Power Supply PCB	Figure 2, #1
Carriage Motor encoder PCB (replaced with Carriage Motor)	Figure 1, #2
Printwheel encoder PCB (replaced with Carriage Assembly)	Figure 1, #3





# Apple Daisy Wheel Printer Technical Procedures

## Section 3

### Take-Apart

#### Contents:

IMPORTANT: READ THIS FIRST.....	3.3
---------------------------------	-----

#### Procedures:

1 - Remove Main PCB.....	3.5
2 - Remove/Replace Power Supply Switch.....	3.9
3 - Remove Mechanical Assembly.....	3.11
4 - Remove/Replace Power Supply PCB.....	3.13
5 - Remove/Replace Carriage Drive Motor.....	3.15
6 - Remove/Replace Carriage Assembly.....	3.19
7 - Adjust Drive Belt Tension.....	3.27
7a- Horizontal Registration Test.....	3.28
8 - Replace Mechanical Assembly.....	3.31
9 - Replace Main PCB.....	3.33
10 - Adjust Ribbon Shield.....	3.34
11 - Final Check.....	3.36

**NOTE:** If you are using this manual for training, perform only the steps marked with an asterisk (\*). By following the marked steps in order, you will completely disassemble and then reassemble the printer with a minimum of duplicated actions.



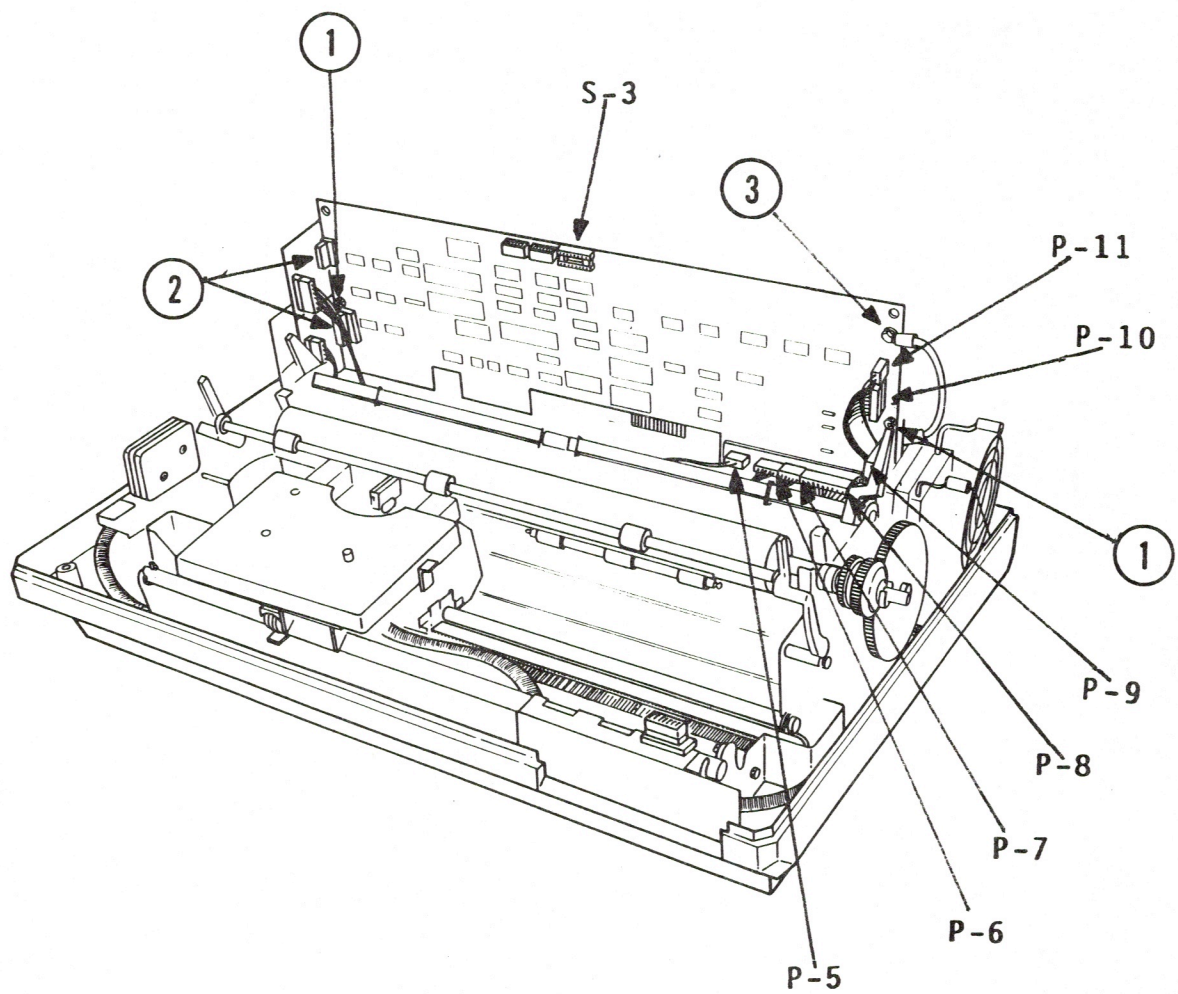


**IMPORTANT: READ THIS FIRST**

In all the procedures that follow, be especially careful of the following:

1. **DO NOT OVERTIGHTEN SCREWS, NUTS, ETC.:** To avoid stripping and breaking parts of the printer, be sure to tighten screws, etc., **only as much as needed** to hold the adjustment. If you are tempted to give a screw an extra turn "just to make sure it's tight enough," resist the temptation!
2. Make certain you recover all screws, nuts, etc., before turning the printer on again. Any foreign metal object dropped into the printer could cause a short circuit and a lot of damage.
3. **Always turn off the power and disconnect the AC power cord before working inside the printer.** The Power Supply Printed Circuit Board, located beneath the mechanical assembly, carries a lethal voltage when the power is on.





## Procedure 1

### 1 - REMOVE MAIN PCB

**Tools required:** Medium flatblade screwdriver  
Felt pen or marker

There are four printed circuit boards in the Apple DWP. The main PCB is the large board at the rear of the printer. (Two small encoder PCBs plug into the left side of the main PCB; they control the printwheel motor and the carriage drive motor. The power supply PCB is beneath the mechanical assembly.)

- \*1. Disconnect the AC power cord.
- \*2. Remove the top cover.
- \*3. Unplug the ribbon cable from jack S-3 (top center of PCB).
- \*4. Disconnect the ground wire from the upper right side of the PCB (see Figure 1, #3).
- \*5. The main PC board is held by two plastic fasteners, one at each top corner. Pull one fastener away from the board and hold it as you push the board away from the fastener with your other hand; repeat for the other side.
- \*6. There are two mounting holes midway between the top and bottom of the board. Lift the board halfway up and install it on the fasteners using these mid-point holes. (See Figure 1, #1.) If you have trouble raising the PCB, try to free it by pushing with your finger through the RS232 slot on the lower left of the rear panel.
- \*7. Unplug the two encoder PCBs from the extreme left side of the main PCB. (See Figure 1, #2.)
- \*8. Number the cable connectors on the right side of the PCB with the felt pen, according to the P-numbers on Figure 1, so that you will be able to reinstall them correctly.

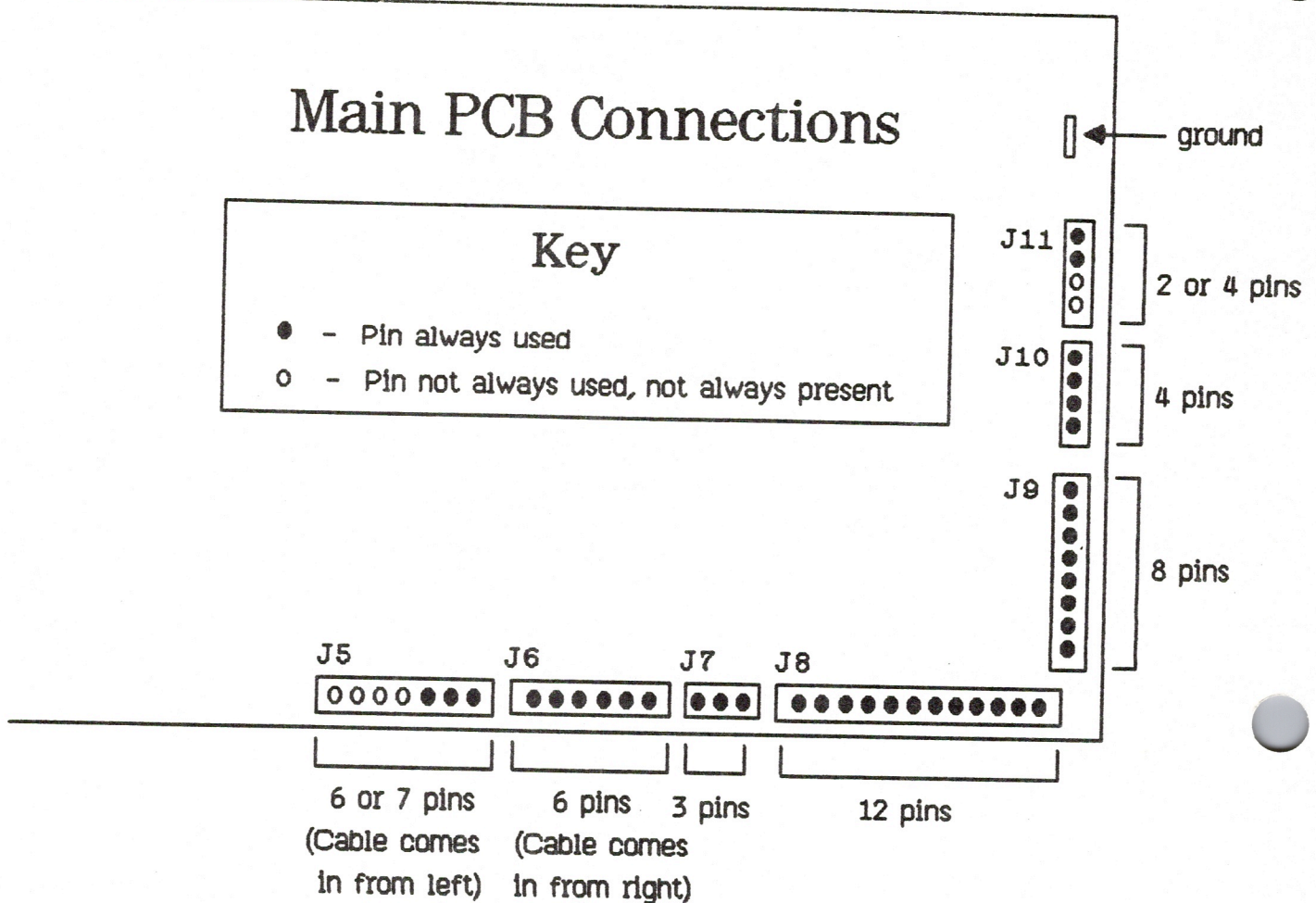
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## Main PCB Connections

### Key

- - Pin always used
- - Pin not always used, not always present



## Connector Assignments

**J5** Cover Interlock,  
Out of paper detect,  
Forms tractor/sheet feeder  
connection

**J6** Operator  
Panel

**J7** Carriage  
Assembly  
Motor

**J8** DC Power

**J9** Printwheel Motor,  
Ribbon feed motor,  
Hammer coil

**J10** Paper Feed  
Motor

**J11** Hammer Resistor

FIGURE 2

## Procedure 1

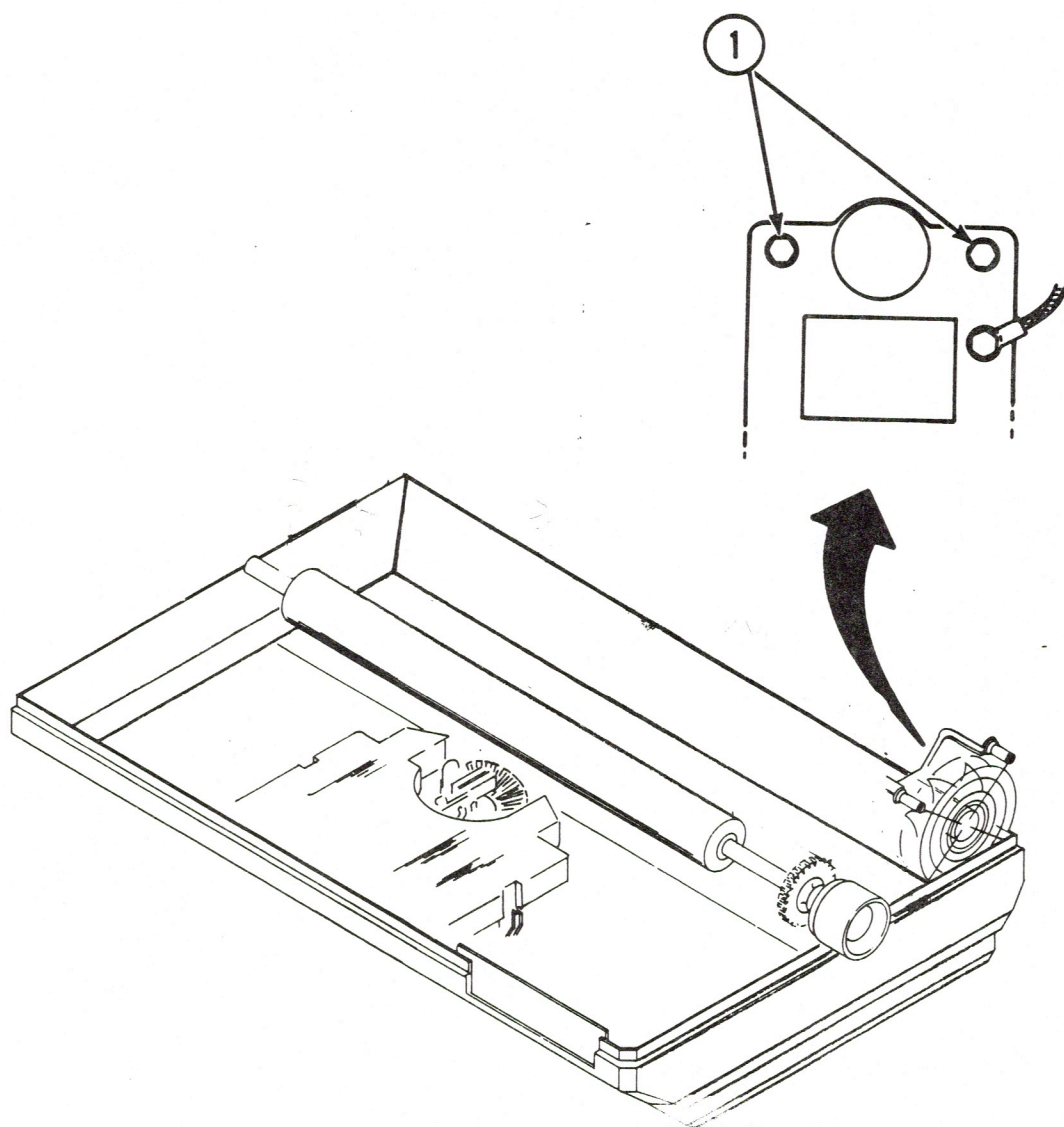
- \*9. Mark any empty pins on the jacks (see Figure 2).

**NOTE:** The cable connections on the main PCB have gone through many revisions, and not all are documented here; so it is important to mark the jacks and connectors before disconnecting anything.

- \*10. Then remove all the connectors (P11 through P5) from the jacks, **being careful to pull only on the connectors, not on the wires.** (Pulling on the wires can cause bad connections to develop, which creates intermittent problems that are very difficult to troubleshoot.)
- \*11. Release the main PCB from the fasteners and remove it from the printer.



## Procedure 2



**FIGURE 3**

## Procedure 2

### 2 - REMOVE AND INSTALL POWER SUPPLY SWITCH

**Tools required:** 1/4 or 5/16 inch nut driver  
1/4 or 5/16 inch wrench  
Needlenose pliers  
Diagonal cutters  
Medium flatblade screwdriver  
Felt pen or marker

#### To Remove:

1. Disconnect the power cord and remove the main PCB (see Procedure 1).
- \*2. Using a nut driver and a wrench, remove the two screws that hold the fan to its mounting bracket (see Figure 3, #1).
- \*3. Carefully lift the fan out of the printer as far as its wires permit, keeping hold of both the front and back of the fan, and return the screws to the fan to prevent it from coming apart.

**NOTE:** If the fan wires are very short, unplug them from their jack on the Power Supply PCB (bottom of printer). Then lift the fan out of the way.

- \*4. Mark or note the position of the four wires to the power switch; then slide the spade connectors off the power switch. (You may need to use long nose pliers to remove the spade connectors.)
- \*5. Depress the spring lever (cut the tie wrap if present) at the top of the power switch and push the switch out of the printer.

#### To Install:

- \*1. Put the switch in place but leave it loose.
- \*2. Connect the wires (top wires come from Power Supply PCB; blue wires are toward outside of printer [right side, as you look from the front]).
- \*3. Push the switch into its socket so that it snaps into place.
- \*4. Install the fan. **NOTE:** Tighten the screws evenly and check that the fan turns freely. If it does not, the screws are too tight or too loose.



Procedure 3

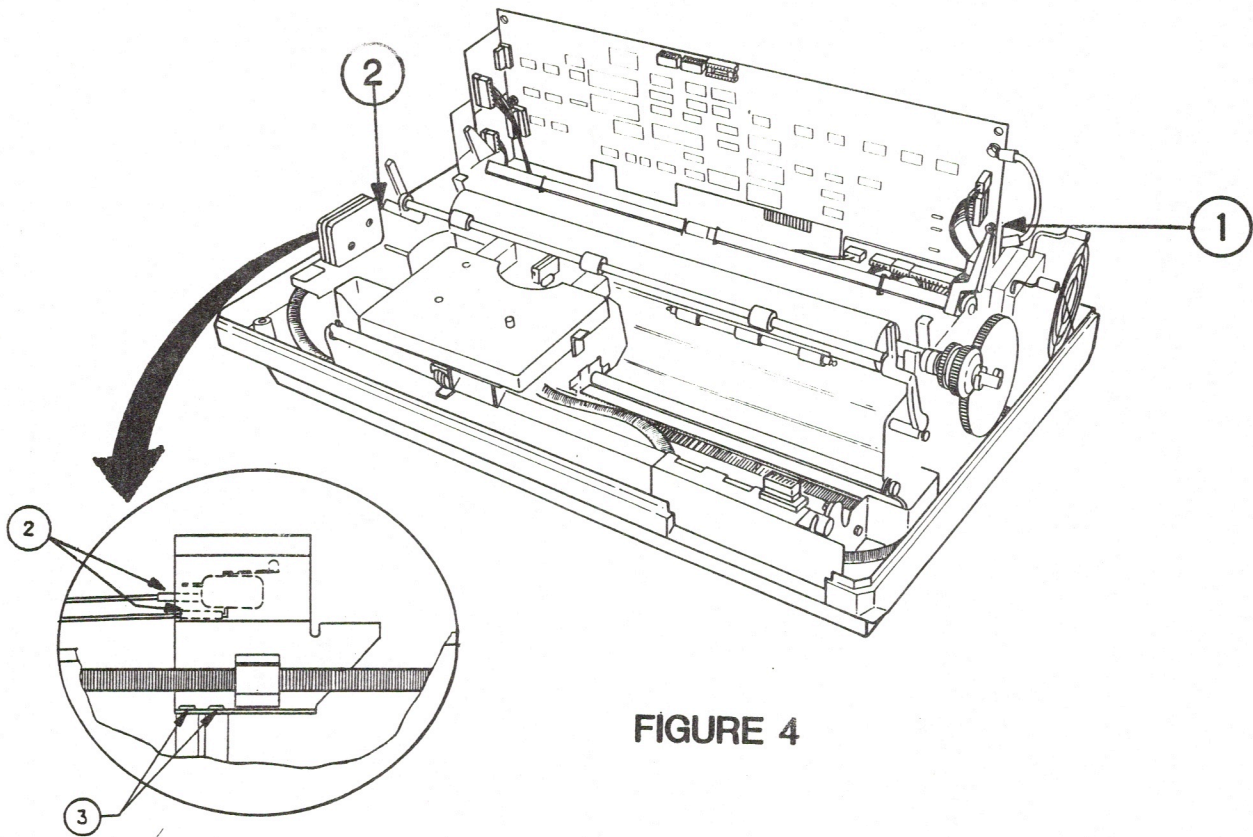


FIGURE 4

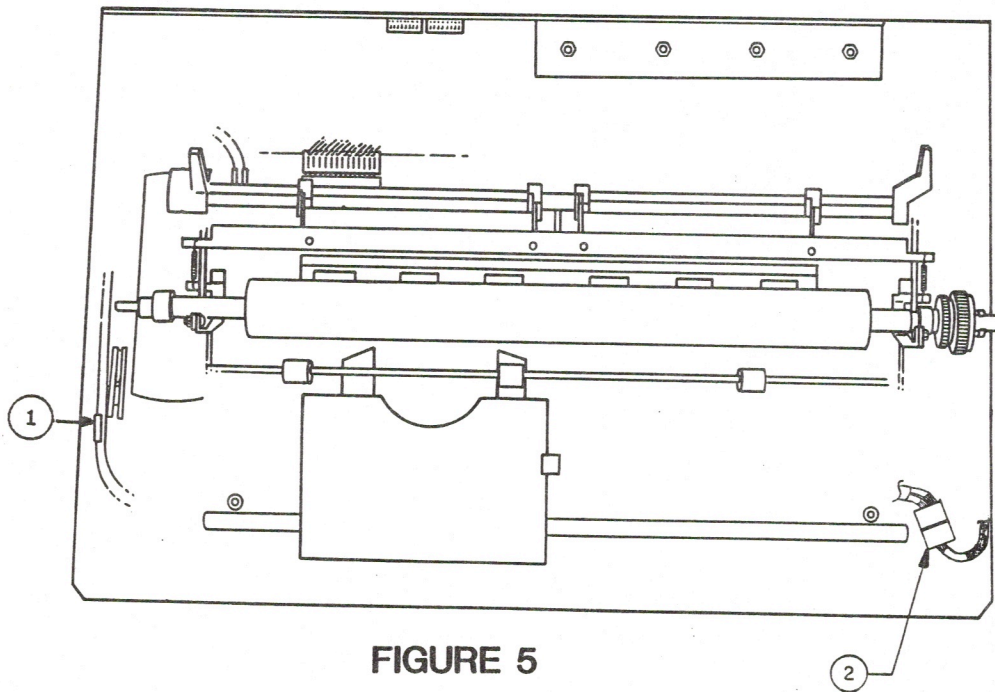


FIGURE 5

### Procedure 3

**IF PRACTICING THIS PROCEDURE FOR TRAINING, SKIP STEPS 5 AND 6 AND GO ON TO PROCEDURE 3.**

5. Replace the main PCB (see Procedure 9).
6. Perform Final Check (see Procedure 11).

### 3 - REMOVE MECHANICAL ASSEMBLY

**Tools required:** Medium flatblade screwdriver  
Needlenose pliers  
Felt pen or marker

By **mechanical assembly** we mean the entire printer mechanism, except for the printed circuit boards, the printer case and the fan.

1. Disconnect the power cord and remove the main PCB (see Procedure 1).
- \*2. Disconnect the ground wire from the back plate of the case (see Figure 4, #1).
- \*3. Hold the mechanical assembly in place as you remove the four retaining screws on the underside of the printer.
- \*4. Remove the two spade connectors from the cover interlock switch (Figure 4 and detail, #2), using needlenose pliers or a flatblade screwdriver if necessary.

**NOTE:** These cables need not be marked: they are interchangeable. But they must be installed on the correct poles (the lower two poles) of the switch.

- \*5. Release the harness cable (large silver coil-wrapped cable) from its clamp near the left side-frame. (See Figure 5, #1; this clamp is not present on some printers, however.)
- \*6. Unplug the harness cable connector from its mate on the right front side of the assembly (see Figure 5, #2).
- \*7. (Optional but recommended) Remove the two screws that hold the cover interlock switch to the printer case and remove the switch (see Figure 4, detail, #3). (This is not possible on some models of the DWP.)
- \*8. Lift the mechanical assembly up and out of the printer case, **being careful of the cables on the right side of the frame.**



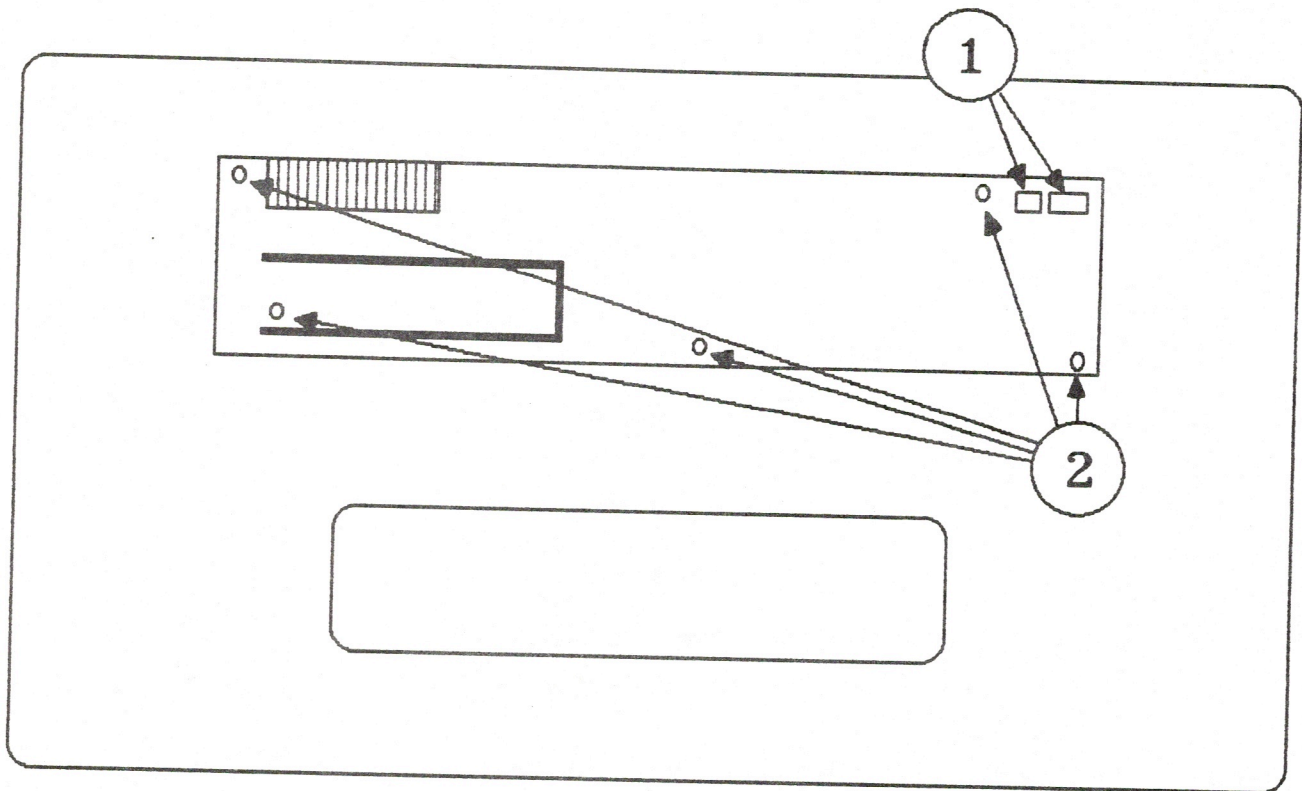


FIGURE 6

## Procedure 4

### 4 - REMOVE AND REPLACE POWER SUPPLY PCB

**Tools required:** Medium flatblade screwdriver  
Needlenose pliers  
Felt pen or marker

#### To Remove:

**WARNING: ALWAYS DISCONNECT THE AC POWER CORD BEFORE TOUCHING THE POWER SUPPLY PCB. LETHAL VOLTAGE IS PRESENT WHEN THE AC POWER CORD IS CONNECTED.**

1. Disconnect the power cord and remove the main PCB (see Procedure 1).
2. Remove the mechanical assembly (see Procedure 3).
- \*3. Disconnect P-1 and P-2 from the right side of the power supply PCB (see Figure 6, #1).
- \*4. Five white plastic peg fasteners hold the board down on early versions; on later printers, some of the peg fasteners are replaced by screws. If screws are present, remove them first. (See Figure 6, #2, for positions.)
- \*5. Free the board from the plastic fasteners by depressing the lip of a fastener (use small screwdriver, needlenose pliers or fingers), then lifting the board slightly off the fastener, and repeating until the board is free.
- \*6. Lift the power supply PCB from the frame.

#### To Replace:

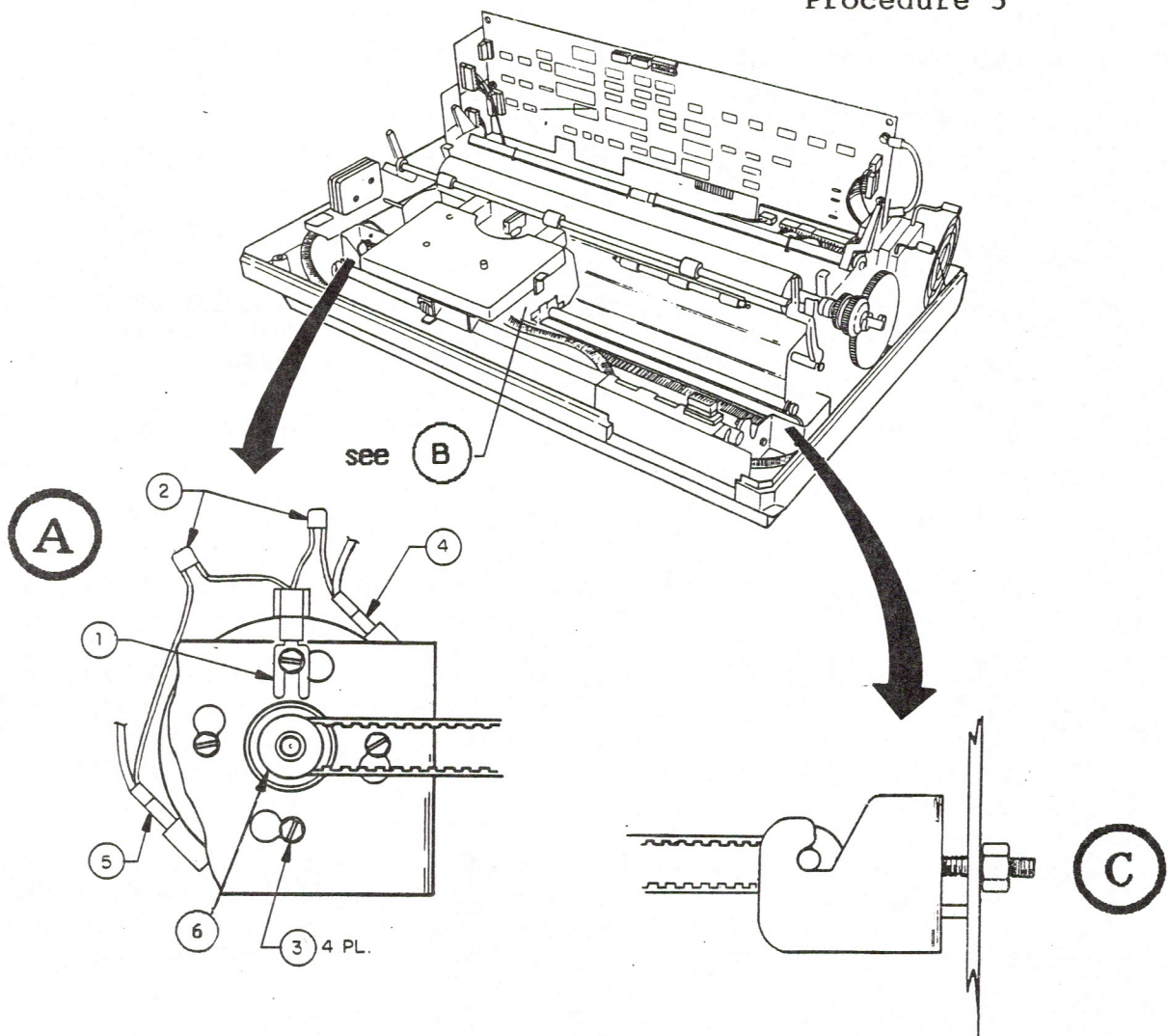
- \*1. Install the power supply PCB on its fasteners. Push down to lock.
- \*2. Replace screws (if there were screws).
- \*3. Attach connectors P-1 and P-2 (on right side of power supply PCB) (see Figure 6, #1)

**IF PRACTICING THIS PROCEDURE FOR TRAINING, SKIP STEPS 4-6.**

4. Reinstall the mechanical assembly (see Procedure 8).
5. Reinstall the main PCB (see Procedure 9).
6. Perform Final Check (see Procedure 11).



# Procedure 5



## (B) Right Side-view of Carriage Assembly

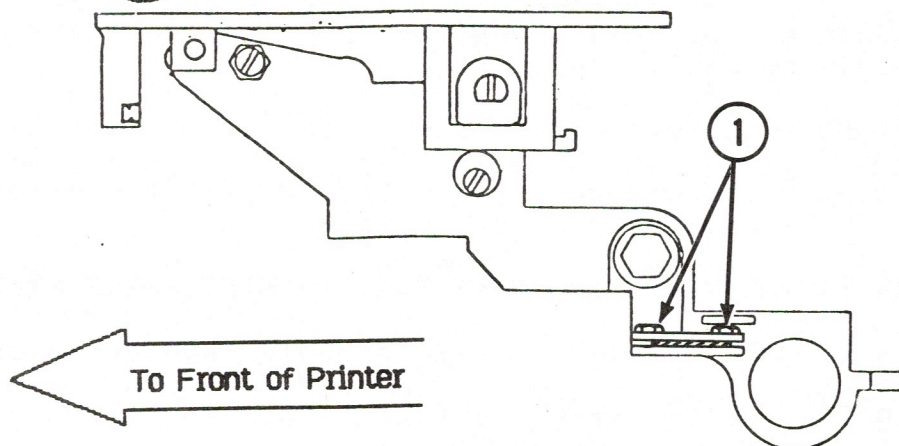


FIGURE 7

## 5 - REMOVE AND REPLACE CARRIAGE DRIVE MOTOR

**Tools required:** Medium flatblade screwdriver  
Needlenose pliers  
Felt pen or marker  
Wrenches: 11/32, 3/16, 1/4 inch  
Diagonal cutters  
Apple Combination Gauge and Spring gauge  
Ruler

### To Remove:

1. Disconnect the power cord and remove the main PCB (see Procedure 1).
2. Remove the mechanical assembly (see Procedure 3).
- \*3. Remove the ribbon cartridge and printwheel (see **User's Manual**).
- \*4. Push the print hammer assembly back into normal printing position.
- \*5. Loosen the drive belt by loosening the adjustment nut on the right side (see Figure 7C) with 11/32 inch wrench. (Do not remove nut from screw.)
- \*6. Remove the drive belt from the right side of the carriage assembly by loosening the two screws holding the belt (see Figure 7B, #1) with a 3/16 inch wrench or small flatblade screwdriver, and then pulling the belt out of its bracket.
- \*7. Loosen the belt around the motor pulley (Figure 7A, #6).
- \*8. **CAUTION:** Two small capacitors (Figure 7A, #2) are mounted between the ground wire connector (Figure 7A, #1) and the two spade connectors on the carriage motor. In the following step, **AVOID STRAIN ON THESE WIRES:** it may break the capacitors.  
  
With a screwdriver or 1/4 inch wrench, loosen the top mounting screw and remove the ground wire connector (Figure 7A, #1).
- \*9. With a screwdriver and/or a 1/4 inch wrench, loosen the top mounting screw and remove the ground wire connector.
- \*10. Detach the two spade connectors from the brush mountings on the motor (Figure 7A, #4 and 5). It's easiest to pry them off with a screwdriver, using a twisting motion.



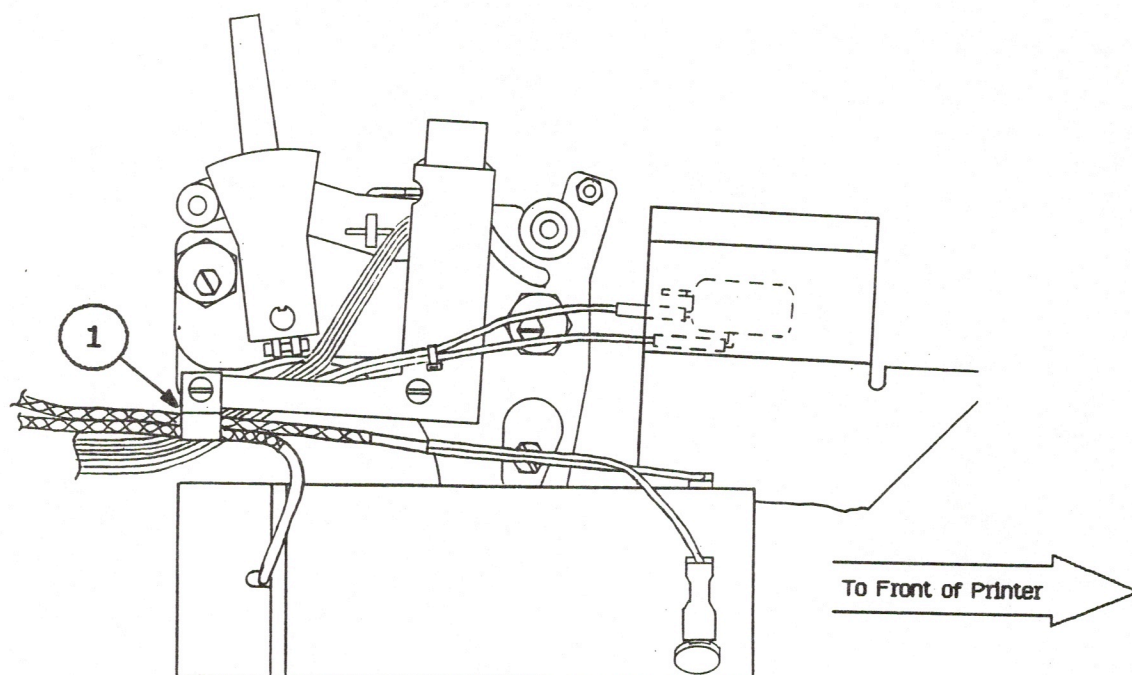


FIGURE 8

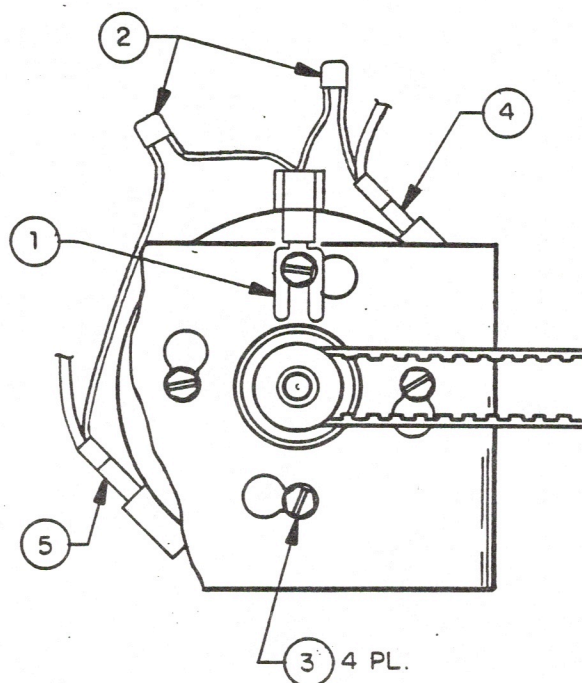


FIGURE 9

## Procedure 5

- \*11. On some models, the motor cables are held to the mechanical assembly with a clamp (Figure 8, #1). If yours has this feature, unhook the cables from the clamp.
- \*12. If the motor cable is clamped to the back shaft of the mechanical assembly with cable ties, cut the ties to free the cable.
- \*13. With a screwdriver and/or a 1/4 inch wrench, remove the four mounting screws holding the carriage drive motor (see Figure 9, #3).
- \*14. Remove the carriage drive motor and its encoder PCB.

**NOTE:** The carriage motor and encoder PCB are always replaced as a unit. Each encoder PCB is matched to a particular motor by the factory.

### To Install New Motor:

- \*1. Place the carriage drive motor against its bracket on the mechanical assembly (red pole is at 1 o'clock position).
- \*2. Reposition the ground wire at the top mounting hole of the motor and insert the screw.
- \*3. Replace and tighten the other three motor-mounting screws. (HINT: Start with the screw at 3 o'clock position and go clockwise. To position the screw at 9 o'clock position, hold it in the box end of the 1/4 inch wrench and lower it into place. Then you can start it with the screwdriver.)
- \*4. Attach the two spade connectors (black wire to black connector and red to red).
- \*5. If the motor cables were clamped to the mechanical assembly, replace them in the clamp.

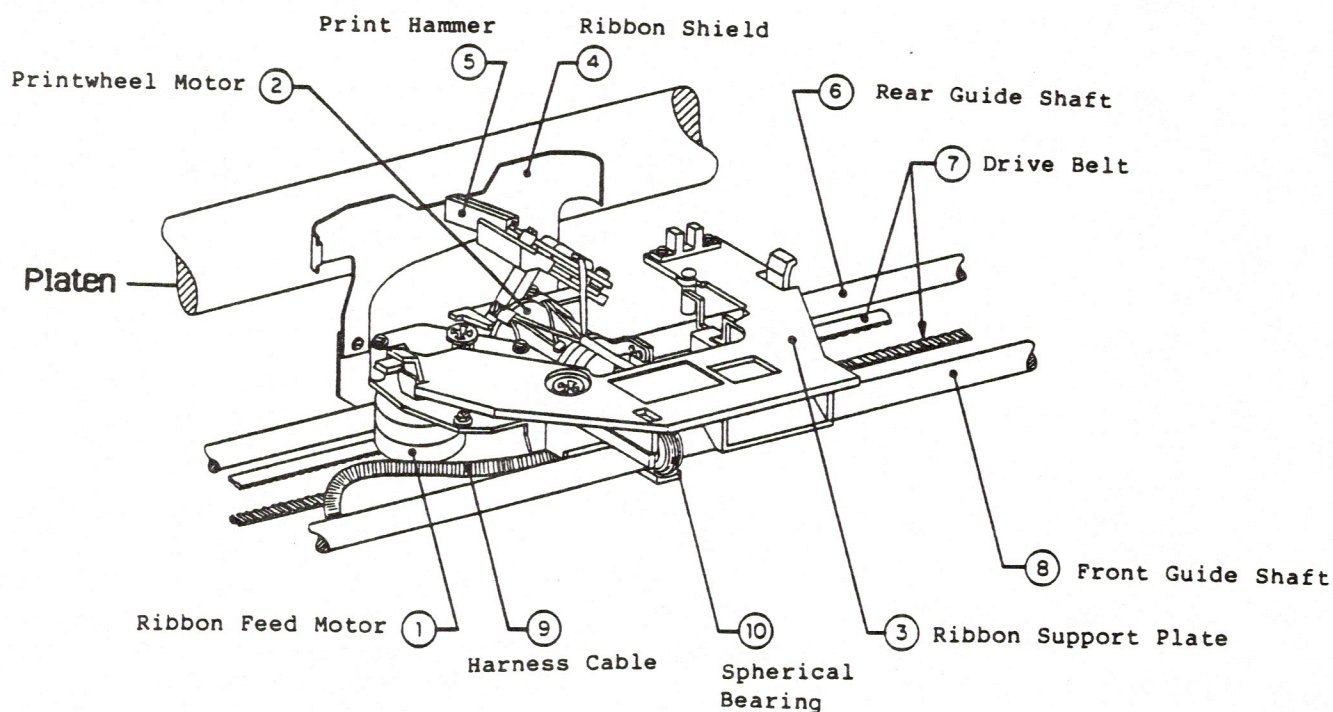
### IF YOU ARE USING THIS PROCEDURE FOR TRAINING, SKIP TO PROCEDURE 6.

- 6. Reroute the drive belt around the motor pulley (see Figure 9). (Make sure that the smooth side of the belt is on the outside and that the belt goes through the slot in the chassis.)
- 7. Reinsert the drive belt into its bracket on the right side of the carriage assembly as far as it can go, and tighten the two screws that hold it there.



## Procedure 5

8. Adjust the drive belt tension (see Procedure 7).
9. **CAUTION:** In this step, watch the cables on the right side of the printer as you lower the mechanical assembly into place. The drive belt adjustment screw tends to catch on these cables and can damage them.  
  
Reinstall the mechanical assembly (see Procedure 8).
10. Reinstall the main PCB, but leave it in service position (see Procedure 9).
11. Plug the new encoder PCB into the main PCB.
12. Attach the motor cable to the new encoder PCB.
13. Perform Horizontal Registration Test (see Procedure 7a, below) and fine-tune belt tension.
14. Return the main PCB to operating position (see Procedure 9, steps 5 - 8).
15. Perform a Final Check (see Procedure 11).
16. Replace and fasten the top cover and access panel.



**FIGURE 10 - The Carriage Assembly**

## 6 - REMOVE AND REPLACE CARRIAGE ASSEMBLY

**Tools required:** Medium flatblade screwdriver  
Needlenose pliers  
Felt pen or marker  
Wrenches: 3/16, 1/4, and 11/32 inch  
Apple combination gauge  
Spring gauge  
Ruler

Figure 10 shows the basic components of the carriage assembly: the ribbon support plate (#3), ribbon feed motor (#1), printwheel motor (#2), and print hammer assembly (#5). The print hammer can be replaced by itself (see **Print Quality Adjustments**). If any of the other three parts is faulty, replace the entire carriage assembly.

**NOTE:** These procedures assume that you will remove the mechanical assembly before removing the carriage assembly. The carriage assembly can be removed and replaced while the mechanical assembly is in the printer, but the procedure is more awkward and difficult.

### To Remove:

1. Disconnect the power cord.
2. Remove the main PCB (see Procedure 1).
3. Remove the mechanical assembly (see Procedure 3).
4. Remove the ribbon and printwheel.
- \*5. So that you will know how the new carriage assembly should look when installed, push the printwheel assembly back into normal position and move the carriage assembly back and forth in the printer to see how it looks and feels, how the harness cable (Figure 10, #9) is routed, and where the three harness cable clamps are placed on the base plate.
- \*6. The harness cable is held to the base plate by three clamps (left, right and center). Mark the position of the three clamps on the base plate.
- \*7. Loosen the clamps and free the cable, but leave the clamps attached to the base plate.

CONTINUED ON NEXT PAGE



Procedure 6

FIGURE 11

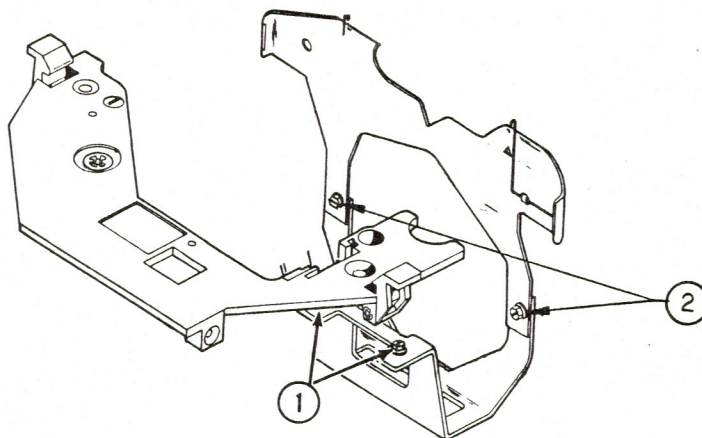


FIGURE 12

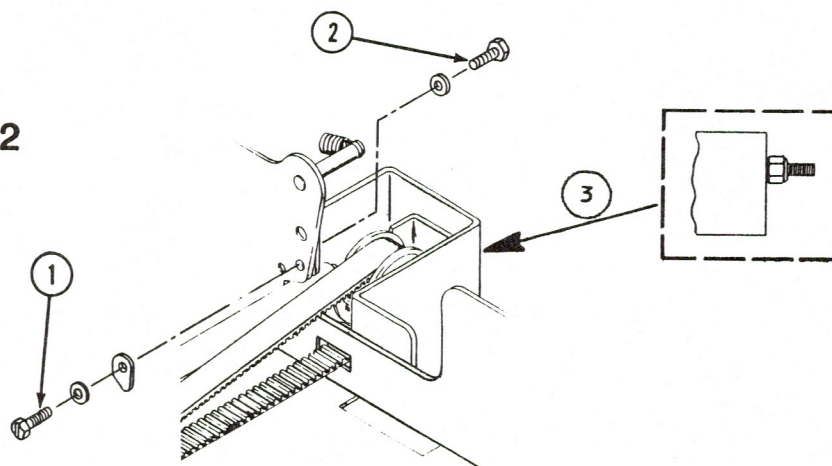
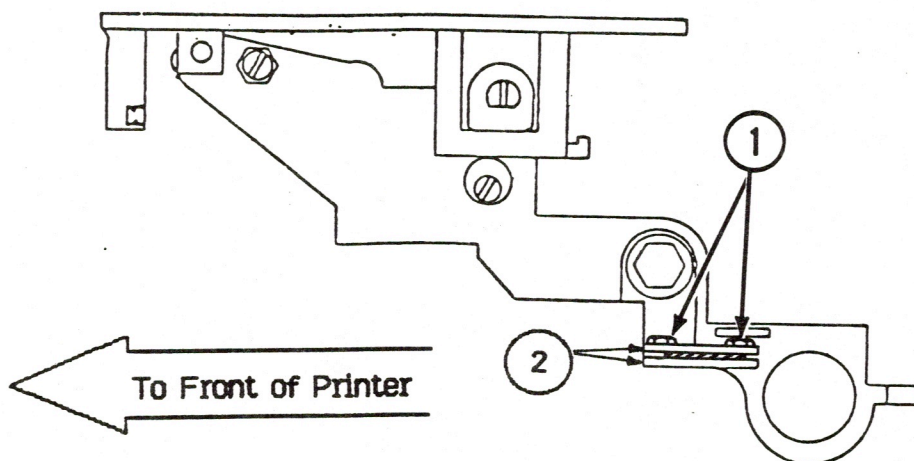


FIGURE 13

Right Side-view of Carriage Assembly



## Procedure 6

- \*8. Unplug the encoder PCB from the harness cable and lay it aside.

**NOTE:** The encoder PCB, which controls the printwheel motor, is "tuned" to this particular carriage assembly at the factory. Then you install a new carriage assembly, you must also install the new encoder PCB supplied with it.

- \*9. Remove the ribbon shield (Figure 10, #4) as follows:

- a) Tilt back the print hammer assembly.
- b) Remove the two screws that hold the ribbon shield to the carriage assembly (Figure 11, #1).
- c) Slide the ribbon shield to one side and lift it out.

**NOTE:** The printwheel motor is magnetized and may capture the loose screws. If one of the screws is missing, look there first.

- 10. Loosen the drive belt by loosening the adjusting nut on the right side as far as you can (Figure 12, #3). (Use 11/32 inch wrench.)

- 11. The drive belt is held to the right side of the carriage assembly by two screws (see Figure 13, #1). Loosen but do not remove the screws, and pull the belt out of the bracket (Figure 13, #2).

- \*12. The carriage rides on the rear guide shaft (Figure 10, #6). On each side of the rear shaft is a small locking plate that holds the shaft in place (see Figure 12, #1). Mark or note the position of the two locking plates, and then loosen (but do not remove) them.

- \*13. Use a 1/4 inch box wrench to remove the outer screw on the right side of the frame (see Figure 12, #2).

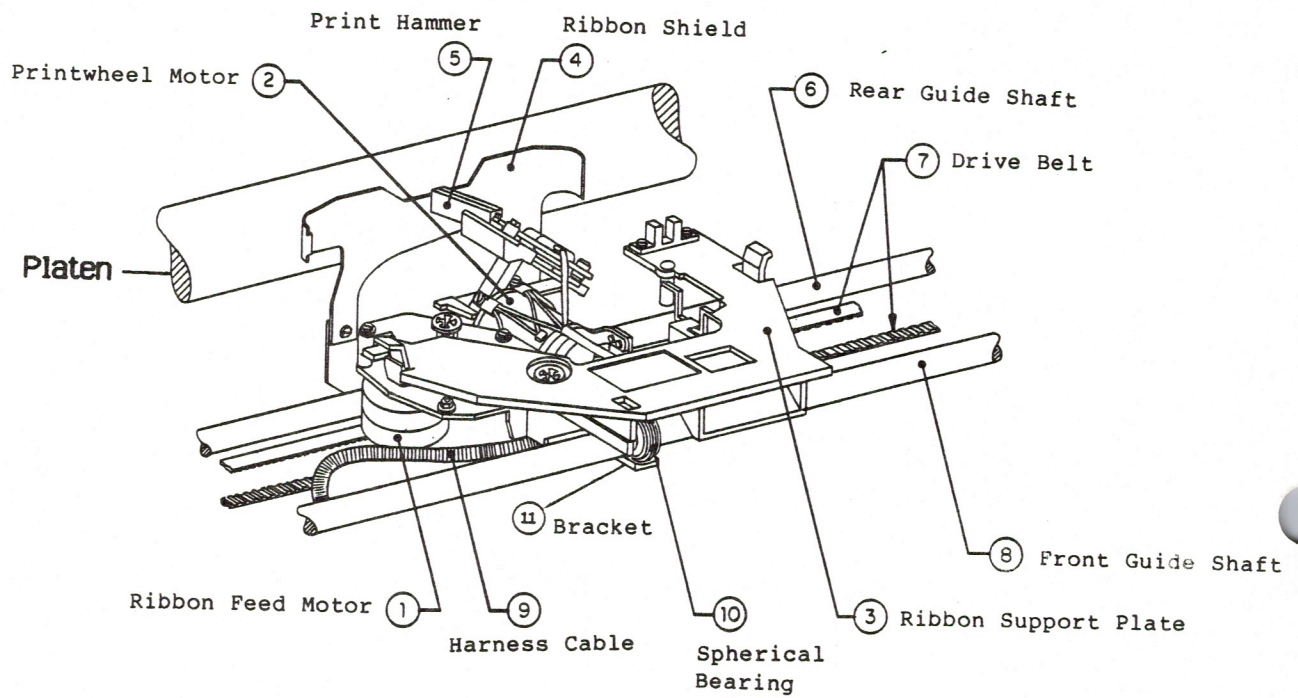
- \*14. Slide the carriage assembly all the way to the left.

- \*15. Remove the rear shaft as follows:

- a) Lift the right side of the shaft free of its mounting slot (you may have to push the pulley out of the way).
- b) Then pull the shaft out of the assembly completely. If you have trouble, make sure the carriage assembly is as far left as possible.



## Procedure 6



**FIGURE 14**

## Procedure 6

- \*16. Pull the two ends of the harness cable through the holes in the mechanical assembly.
- \*17. Pull the drive belt out through the hole in the left side of the frame, so that it is hanging freely from the left side of the carriage assembly.
- \*18. Free the carriage assembly from the front guide rail shaft by lifting it up and toward the platen. (**CAUTION:** Don't force it! Notice the plastic bracket under the front shaft (Figure 14, #11), which may catch on the shaft if you're not careful.)
- \*19. Remove the carriage assembly from the printer.
- 20. With a 3/16 inch wrench, loosen the two screws holding the drive belt to the left side of the carriage assembly, and free the belt.

### To Install New Carriage Assembly:

1. Insert the drive belt into the left side of the new carriage assembly and tighten the two screws. **Make sure the cleated side of the belt is facing DOWN.**

**CAUTION:** Don't overtighten the screws; make sure the belt fits into the cleats of the little bracket on the carriage assembly.

- \*2. Fit the carriage assembly onto the spherical bearing on the front shaft (see Figure 14, #10).
- \*3. Route the harness cables so that the cables will cross under the carriage assembly, and push the two connectors through the holes in the mechanical assembly.
- \*4. Slide the carriage assembly as far left as possible.
- \*5. Insert the rear shaft through the carriage assembly and into the left side hole.
- \*6. Push the right side of the shaft into its slot (a pushing/rolling motion works best).
- \*7. Notice the C-clamps at the right end of the rear shaft. Make sure that the open part of the C-clamps points down.



Procedure 6

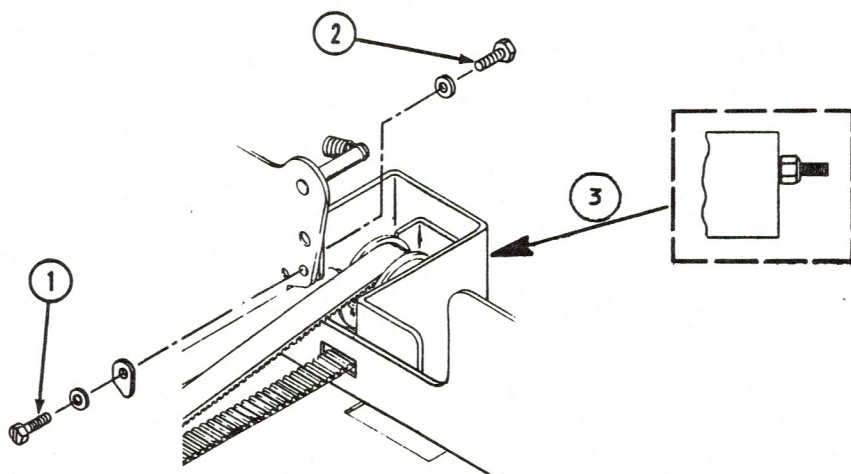


FIGURE 15

## Procedure 6

- \*8. Replace the outer screw and washer (Figure 15, #2). **DO NOT OVERTIGHTEN!**
- \*9. Reposition the two rear shaft locking plates, making sure they butt against the shaft, and tighten the screws (see Figure 15, #1).
- \*10. Reroute the drive belt: over the pulley on the left side, through the slot in the left side of the frame, across to the right side, through the slot, and around the right pulley (see Figure 15). (Reinstall the right side pulley if it has come out of its slot, making sure that the pulley has a flat brown thrust washer on either side.)
- \*11. Insert the right side of the drive belt into the carriage assembly as far as it will go, and tighten the two screws.
- \*12. Tighten the drive belt adjusting nut (Figure 15, #3) to take up some of the slack, but do not make the belt taut: if it is taut, the carriage assembly will not move.
- \*13. Reroute the harness cable under all three clamps on the base plate, and screw down the clamps.
- \*14. Tilt the printwheel motor assembly back to normal printing position and run the carriage assembly back and forth to check for free run and noninterference with the harness cable. Adjust or reroute the cable if necessary.
- \*15. Reinstall the ribbon shield as follows:
  - a) Tilt the print hammer assembly away from the platen.
  - b) Slide the ribbon shield into place.
  - c) Reinstall the two screws but leave them loose.
- \*16. Adjust the ribbon shield depth (see Procedure 10: Depth only, p. 4.34).
- \*17. Reinstall the printwheel and ribbon.
- \*18. Adjust the drive belt tension (see Procedure 7).
- \*19. Reinstall the mechanical assembly (see Procedure 8).

CONTINUED ON NEXT PAGE



Procedure 6

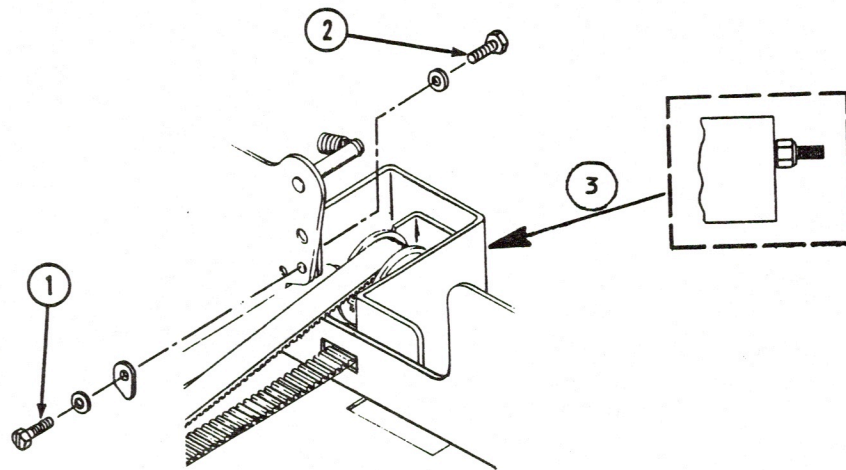


FIGURE 16

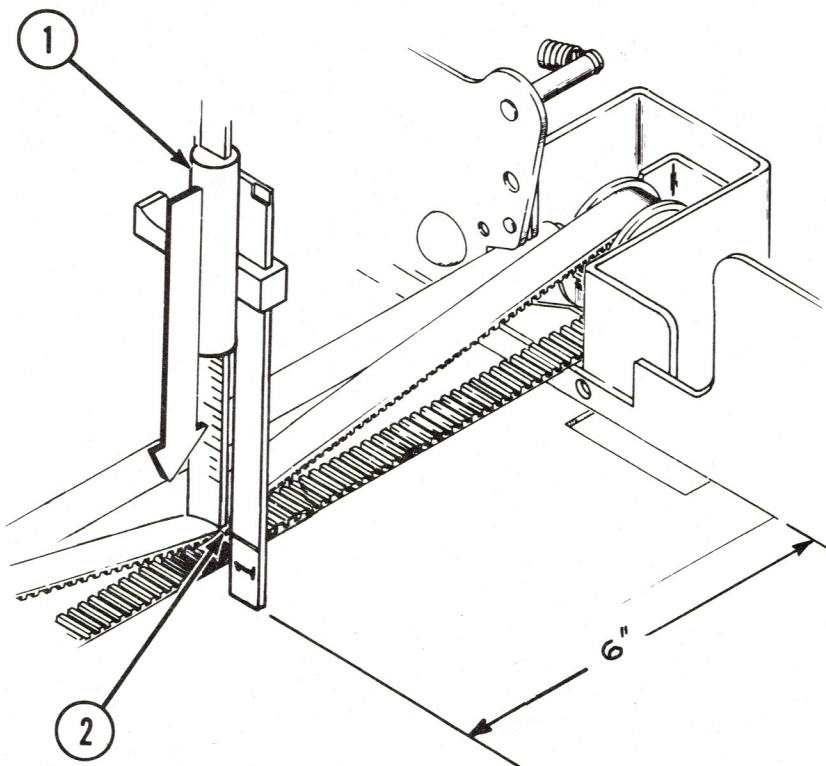


FIGURE 17

## Procedure 7

- \*20. Put the main PCB in service position and reinstall the wires (see Procedure 9, steps 1-4). Make sure to install the **new** encoder PCB that comes with the new carriage assembly.
- \*21. Defeat the cover interlock switch (see **Basics**) and perform the Terminal Self-Test to verify that the new carriage assembly works. If you hear scraping, check the harness cable: if the cable loops near the carriage are too large, they will interfere with carriage motion.
- \*22. If the carriage assembly works properly, lower the main PCB to operating position (see Procedure 9, steps 5-8.)
- 23. Perform the Horizontal Registration Test (see Procedure 7a, below) and fine-tune the belt tension.
- 24. Perform a Final Check (see Procedure 11).

### 7 - ADJUST DRIVE BELT TENSION

**Tools Required:** 11/32 inch wrench, Apple combination gauge, Spring gauge, Ruler

- \*1. Turn the drive belt adjusting nut (Figure 16, #3) clockwise until the belt is fairly taut.
- \*2. Move the carriage assembly to the far left side of the frame.
- \*3. Use a pen to mark a line on the belt six inches from the right side of the frame (see Figure 17).
- \*4. At this same point on the drive belt, place the combination gauge so that the side marked "1" is resting on the base plate of the chassis (see Figure 17).
- \*5. Use a spring scale to push directly down on the marked point on the drive belt with one pound of force (see Figure 17, #1). With the combination gauge resting on the bottom structure, the lowest scribe line on the gauge should be even with the top of the belt (see Figure 17, #2).
- \*6. If the drive belt is too loose, turn the adjusting nut clockwise; if too tight, turn the nut counterclockwise (see Figure 16, #3).

CONTINUED ON NEXT PAGE



## Procedure 7

- \*7. After altering the drive belt tension, move the carriage assembly back and forth several times; then check again for correct tension and adjust if necessary (Steps 2-6).
8. To fine-tune the drive belt tension (and therefore the horizontal registration), perform the Horizontal Registration Test below and tweak the adjusting nut until results are optimum. This is particularly important if the DWP is being used for graphics, as it might be in a Lisa system.

### 7a - HORIZONTAL REGISTRATION TEST

This test helps you fine-tune the drive-belt tension by making any horizontal registration problems easy to see.

To run this test, you need an Apple ///, Apple Writer ///, and familiarity with Apple Writer ///.

1. Connect the printer to an Apple ///, using an RS232 cable and a modem eliminator cable.
2. Install paper 14 inches wide (or use two sheets of 8 1/2 by 11 inch paper, overlapping them so as to cover the entire platen.)
3. Boot Apple Writer /// in the Apple and press <RETURN> twice to obtain a blank screen.
4. Type the following embedded commands, starting each at the very beginning of a line:

(NOTE: Each line below starts with two **letters**. The characters that follow the letters are **numbers** (except for ".PRINTER"). Make sure you type the numerals 1 and 0, not lower-case L and capital O.)

.LM0 <RETURN>

.PM0 <RETURN>

.RM133 <RETURN>

.LI0 <RETURN>

.PD.PRINTER <RETURN>

.CR1 <RETURN>

## Procedure 7

5. Type the vertical line character | at columns 1, 64, 68, and 132; type <RETURN>.
6. Reproduce that "paragraph" at least 15 times in succession. (You are creating a file that will print straight vertical lines at columns 1, 64, 68, and 132. The more times you reproduce the "paragraph", the longer the lines will be, and the easier to check for registration problems.)
7. To print the file, hold down <CONTROL> while typing p.
8. A prompt line will appear at the bottom of the screen saying [P]rint/Program:.

Type:

np

<RETURN>

9. If the lines are straight, the horizontal registration is good; if they are not straight, adjust the drive belt tension and try the test again.

|

||

Loose Belt

|

||

Well-adjusted Belt



Procedure 8

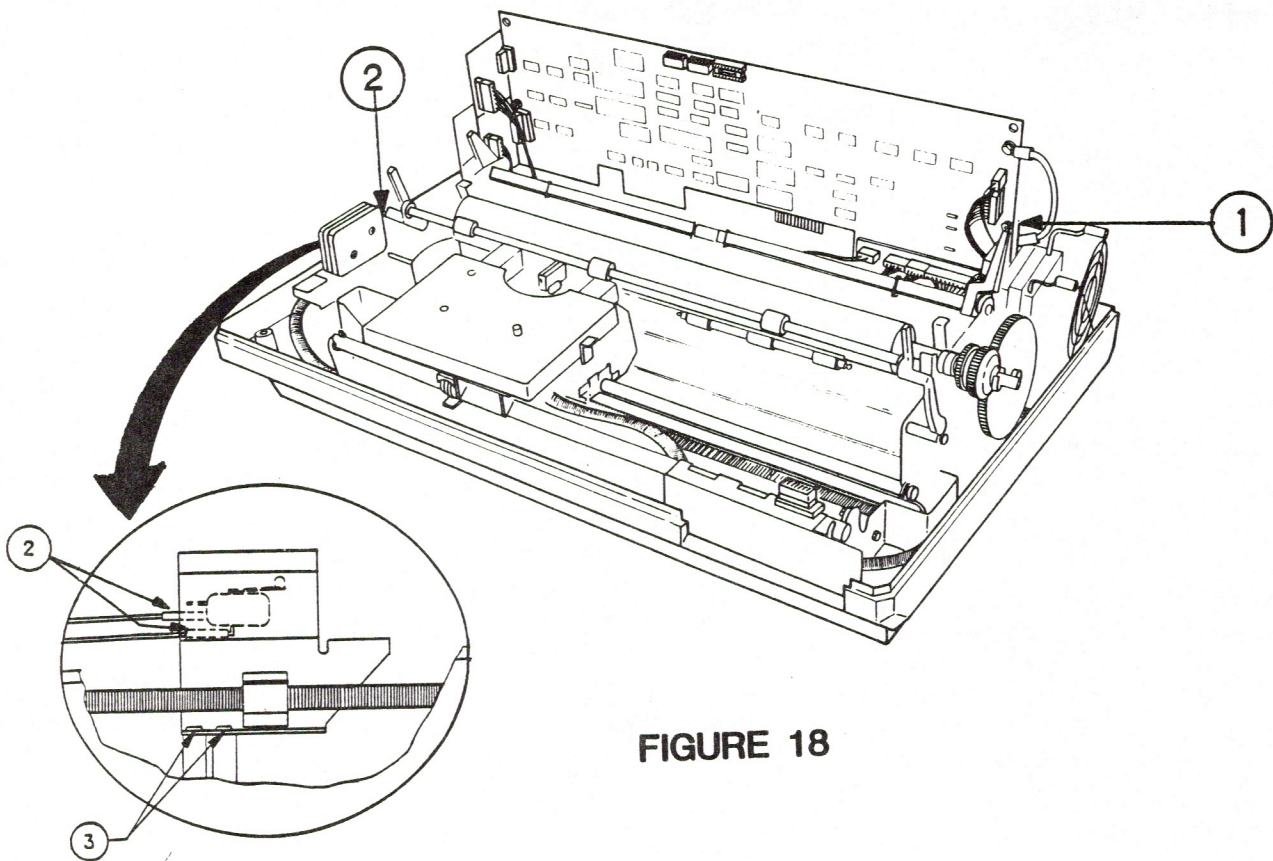


FIGURE 18

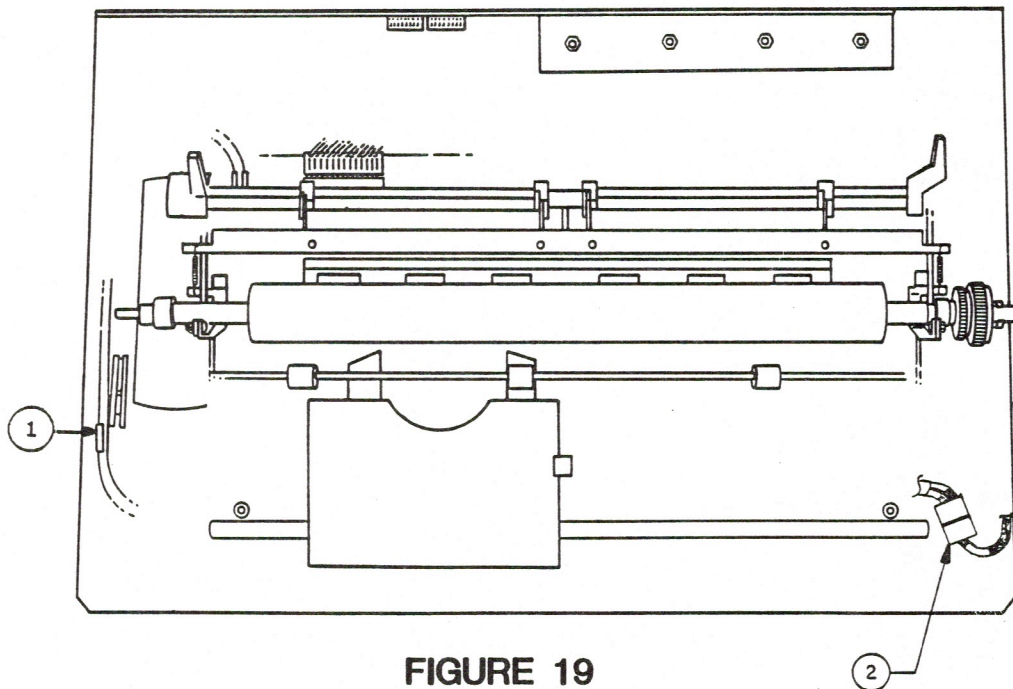


FIGURE 19

## 8 - REPLACE MECHANICAL ASSEMBLY:

**CAUTION: WATCH THE CABLES ON THE RIGHT SIDE OF THE FRAME AS YOU REPLACE THE ASSEMBLY.** The drive belt adjustment screw at the right side of the mechanical assembly often catches on these cables and can easily damage them.

- \*1. Several loose cables lie along the right front side of the case. Make sure they are clamped or taped close to the side of the printer, to avoid damage from the drive belt adjustment screw on the mechanical assembly.
- \*2. Slowly lower the mechanical assembly onto the frame. If you removed the cover interlock switch earlier, you can lower the right side of the assembly first: that will help you avoid catching the cables on the drive belt adjustment screw.
- \*3. If you removed the cover interlock switch, reinstall it.
- \*4. Reconnect the two spade connectors to the cover interlock switch (Figure 18 and detail, #2). Remember that the upper pole of the switch is not used; the connectors attach to the lower two poles.
- \*5. Reconnect the right side of the harness cable to its mate. (Make sure the two sides are correctly aligned: there are different versions of the connector, but there is always an obvious key.)
- \*6. Reconnect the left side of the harness cable to the Printwheel Encoder PCB (the lower of the two encoder PCBs).

**NOTE:** If the Encoder PCB has more pins than the harness cable connector has sockets, examine the connector: there will always be some obvious key to proper installation.

- \*7. Slip the harness cable into its clamp on the left side of the frame (see Figure 19, #1).
- \*8. Reconnect the ground wire to the back of the case, behind the main PCB (see Figure 18, #1).
- \*9. Return and tighten the four long screws on the underside of the printer. (You can line up the screw holes in the mechanical assembly with the holes in the frame by looking down through the mechanical assembly holes.)



This diagram illustrates the exploded view of a mechanical assembly, possibly a typewriter or printer mechanism. The components are labeled as follows:

- 1**: Points to the main body or frame of the device.
- 2**: Points to a component on the left side, possibly a carriage or paper support.
- 3**: Points to a component on the right side, possibly a carriage or paper support.
- S-3**: Points to a small component, possibly a spring or pin, located near the top center.
- P-11**: Points to a component on the right side, possibly a carriage or paper support.
- P-10**: Points to a component on the right side, possibly a carriage or paper support.
- P-9**: Points to a component on the right side, possibly a carriage or paper support.
- P-8**: Points to a component on the right side, possibly a carriage or paper support.
- P-7**: Points to a component on the right side, possibly a carriage or paper support.
- P-6**: Points to a component on the right side, possibly a carriage or paper support.
- P-5**: Points to a component on the right side, possibly a carriage or paper support.

**FIGURE 20**

# Main PCB Connections

**Key**

- - Pin always used
- - Pin not always used, not always present

The diagram illustrates the main PCB connections. A central key defines the pin usage: a solid circle (●) indicates a pin that is always used, while an open circle (○) indicates a pin that is not always used. The connectors and their pin configurations are as follows:

- J5:** A horizontal connector with 7 pins. The first 4 pins are open circles (○), and the last 3 are solid circles (●). It is labeled "6 or 7 pins (Cable comes in from left)".
- J6:** A horizontal connector with 6 pins, all solid circles (●). It is labeled "6 pins (Cable comes in from right)".
- J7:** A horizontal connector with 3 pins, all solid circles (●). It is labeled "3 pins".
- J8:** A horizontal connector with 12 pins, all solid circles (●). It is labeled "12 pins".
- J9:** A vertical connector with 8 pins, all solid circles (●). It is labeled "8 pins".
- J10:** A vertical connector with 4 pins, all solid circles (●). It is labeled "4 pins".
- J11:** A vertical connector with 4 pins. The top 2 are solid circles (●), and the bottom 2 are open circles (○). It is labeled "2 or 4 pins".

A ground connection is indicated by a line with an arrow pointing to the top of the vertical connectors.

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9 - REPLACE MAIN PCB:

- \*1. Return the main PCB to service position (use midpoint holes for the two fasteners). (See Figure 20, #1.)
- \*2. Reconnect the ground wire. (See Figure 20, #3.)
- \*3. Replace the connectors (see Figures 20 and 21).
- \*4. Plug in the two encoder PCBs. The connectors are keyed so that you cannot put the PCBs on the wrong jacks, but be sure the carriage motor's cable goes to the upper encoder PCB and the (printwheel motor's) harness cable to the lower encoder PCB.

If you are installing a Carriage Assembly or Carriage Motor, return to that procedure now.

- \*5. **CAUTION:** In the following steps, AVOID STRAIN ON THE CABLES.

Release the PCB from the work position and ease it down into its ready position. If any cable seems strained, reroute it.

- \*6. Fit the right, center and left parts of the bottom edge into the slot at the back of the frame, and refasten the white plastic fasteners at the top corners of the PCB. **IF YOU HAVE TROUBLE POSITIONING THE PCB,** make sure the slot is clear of debris and the cables are not obstructed by other components. You will have to push the PCB, but if you have to use too much force, something is probably obstructing the board.
- \*7. Reconnect the ribbon cable to jack S-3 (top center of PCB) (see Figure 20).
- \*8. Replace the ribbon cable from jack S-3 in the cable holders on the back of the PCB.
- \*9. If this is a new PCB, test it with the External Loop Back Test (see **Basics**).
- \*10. If you are installing a new carriage motor or carriage assembly, return to that procedure.

If the carriage goes crazy when you turn on the printer, you have probably connected the wrong cables to the encoder PCBs.



## Procedure 10

### 10 - ADJUST RIBBON SHIELD

The metal ribbon shield provides both horizontal and vertical reference marks for text alignment. It also holds the paper against the platen.

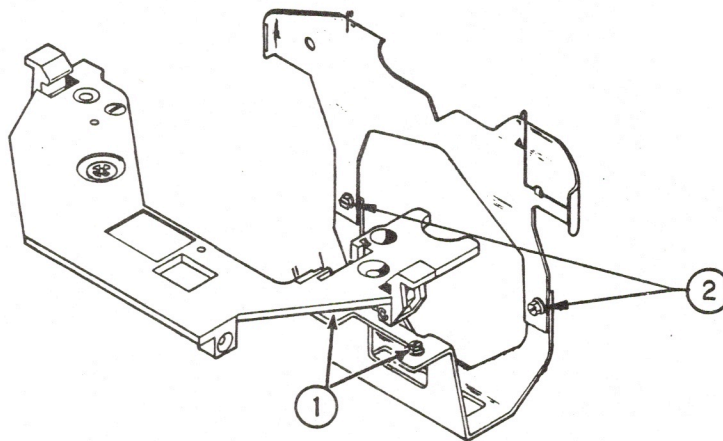
#### Depth:

- \*1. Remove the ribbon cartridge and printwheel (see **User's Manual**), and leave the printwheel assembly tilted away from the platen.
- \*2. **Push the paper thickness lever (at the left rear of the platen) back all the way.**
- \*3. Loosen the two depth control screws on the ribbon shield (see Figure 22, #1).
- \*4. Adjust the shield so that it rests against the platen. Test it by tapping with your finger where it touches the platen (tap both left and right sides). If you can hear the shield clap against the platen, it is too far away: there should be no gap.
- \*5. When the adjustment is correct, tighten the depth control screws.
- \*6. Move the paper release lever forward all the way and test again.

If you are replacing a Carriage Assembly, return to that procedure now.

**Height Adjustment:**

- \*1. Insert paper (11 to 14 inches wide) and run the Terminal Self-Test to print out several rows of letters.
- \*2. Remove the ribbon cartridge and check for the following criteria:
  - a) The bottoms of the letters appear on the baseline of the triangular reference holes on either side of the shield.
  - b) The letter that appears in the central cleft of the shield points straight up. (For best results, turn off the printer and move the carriage until the character in the cleft is l, !, I or |.)
- \*3. If adjustment is necessary, tilt the hammer assembly away from the platen, loosen the up/down mounting screws (see Figure 22, #2) and adjust the shield to the criteria stated in step 2.
- \*4. Tighten the screws and return the ribbon cartridge.



**FIGURE 22**



## Procedure 11

### 11 - FINAL CHECK

Whenever you finish any of these procedures, check that the printer is functioning properly before you return it to the customer.

- \*1. Defeat top cover interlock switch.
- \*2. Reconnect AC power cord.
- \*3. Switch on the power to check the Ready lamp.
- \*4. If installing a new main PCB, test the new board's circuitry by running the External Loop Back Test (see **Section 1, Basics**).
- \*5. Generate a print sample with the Terminal Self-Test.
- \*6. Check the switch settings shown on the printout against the correct settings (shown in **Basics** or on the DWP Reference Card). If the switches are set incorrectly, reset them (see **Basics**).
- \*7. Check the print quality and make any necessary print quality adjustments (see **Troubleshooting** and **Print Quality Adjustments** sections).

# Apple Daisy Wheel Printer Technical Procedures

## Section 4

### Print Quality Adjustments

#### Contents:

Paper Feed Idler Gear Adjustment.....	4.3
Vertical Registration Test.....	4.5
Print Hammer Assembly	
Remove and Replace.....	4.9
Hammer Penetration.....	4.13
Front Stop.....	4.15
Rear Stop.....	4.15
Fine Tuning.....	4.17
Hammer Angle.....	4.19
Ribbon Support Plate	
Check Adjustment.....	4.21
Adjust:	
Metal Up-Stop (Early Version).....	4.23
Plastic Bracket (Current Version).....	4.23
Platen	
When to Check.....	4.25
Height.....	4.25
Depth.....	4.29
Checking the Adjustments.....	4.29
Platen Locator Sleeve.....	4.31

**NOTE:** The Daisy Wheel Printer should be tested with the Apple II Peripherals Diskette. (See **Multi-Product Diagnostics Technical Procedures, Section 1.**)



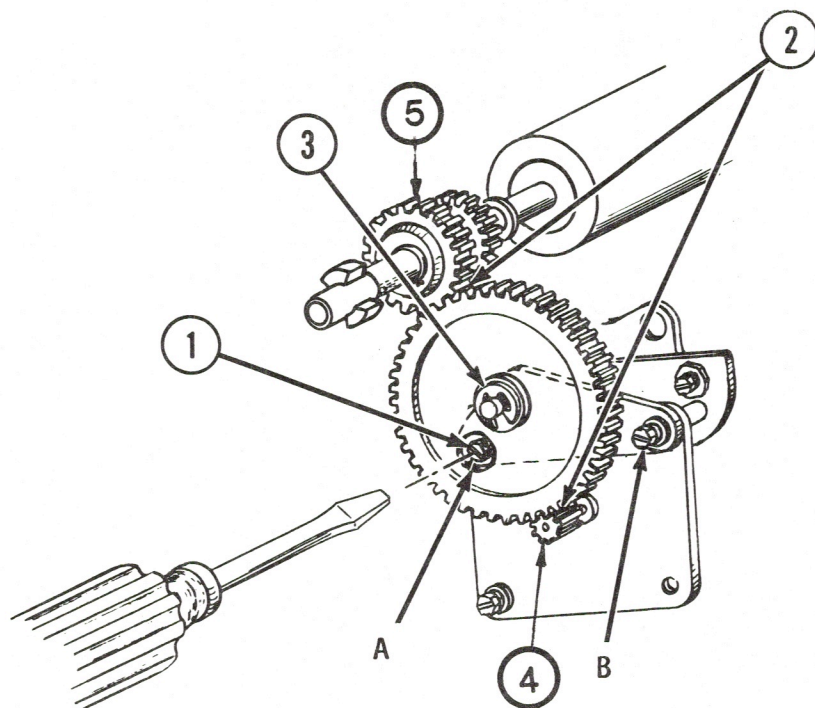


FIGURE 1

## PAPER FEED IDLER GEAR ADJUSTMENT

**WHEN TO CHECK:** No line feeding or irregular line feeding  
(SYMPTOMS)

First character in each line drops below  
correct writing line

### Tools and Materials Needed:

Medium flatblade screwdriver  
Extra screwdriver or other sturdy object  
to use as a prop for the mechanical assembly

The idler gear (Figure 1, large gear) transmits the rotation of the paper feed motor gear (Figure 1, #4) to the platen drive gear (Figure 1, #5). If the three gears do not mesh properly, line feeding will be irregular and binding or backlash will occur (particularly when paper feeds both forward and reverse, as in plotting graphs).

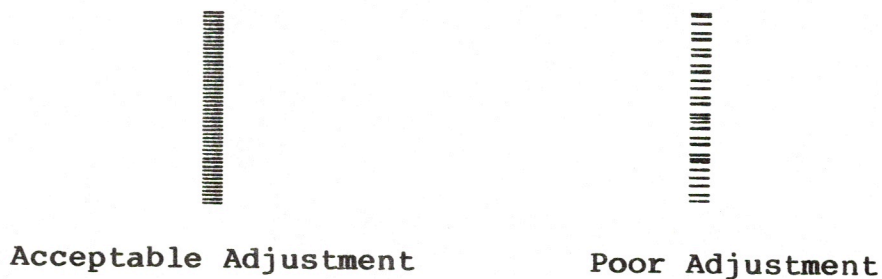
1. Disconnect the AC power cord.
2. Remove the access cover and top cover.
3. To gain better access to the idler gear screws, loosen or remove the four screws on the bottom of the printer case, lift the front of the mechanical assembly about one inch, and prop it up on the right side with a screwdriver or other object.
4. Pull the paper bail forward (away from the platen). (The paper bail is the metal bar with three rubber rollers that holds the paper to the platen. See **Basics** for names of parts.)
5. Turn the platen knob so that screw "A" is visible through the hole in the idler gear (see Figure 1, #1).
6. Loosen the idler gear screws ("A" and "B" in Figure 1).
7. With screws A and B loose, slowly rotate the platen knob clockwise until the gears mesh easily.

**NOTE:** Turning the knob clockwise actually causes the gears to mesh correctly. If you don't believe that, try turning the knob counterclockwise.

CONTINUED ON NEXT PAGE



8. While continuing to rotate the knob clockwise, tighten screw B. **CAUTION:** Do not overtighten!
9. Tighten screw A. **CAUTION:** Do not overtighten!
10. Remove the prop and lower the mechanical assembly to normal position. **CAUTION:** Be careful that the cables at the right front of the printer are not pulled or ripped by the drive-belt-adjustment screw at the right of the mechanical assembly.
11. Defeat the top cover interlock.
12. Reconnect AC power cord.
13. Run the Terminal Self-Test as a check (see **Basics**). If line feeding is regular, the idler gear is correctly adjusted.
14. If a further check is desired, run the Vertical Registration Test (below).
15. Retighten the four screws on the bottom of the printer.



**FIGURE 2**

## VERTICAL REGISTRATION TEST (OPTIONAL)

The following test makes any vertical registration problems easy to see. Figure 2 shows print samples generated by this test, using misadjusted and well adjusted idler gears.

To run this test, you need an Apple ///, Apple Writer ///, and familiarity with Apple Writer ///.

1. Connect the printer to an Apple ///, using an RS232 cable and a modem eliminator cable.
2. Boot Apple Writer /// in the Apple and press <RETURN> twice to obtain a blank screen.
3. Type:

**<CONTROL>p**

(That is, hold down the <CONTROL> key while typing p.)

4. A prompt line will appear at the bottom of the screen saying **[P]rint/Program :.**

Type:

**? <RETURN>**

5. The print/program menu will now appear. Make sure that **Print Destination** is set to **.printer** and that **Carriage Return** is set to **1**. If they are set to something else, type:

**pd.printer <RETURN>**

**cr1 <RETURN>**

**NOTE:** Make sure you type the numeral 1, not lower-case L.

6. Type <RETURN> to return to the blank screen.

CONTINUED ON NEXT PAGE



7. Type <CONTROL>v

A V should appear on the data bar at the top left of the screen. If not, try again.

8. **NOTE:** Some of the characters in this step will not appear on the screen. Don't worry about that.

Type the following with no spaces between characters, and DO NOT PRESS <RETURN> until you are told to:

<ESCAPE>

<CONTROL><SHIFT>6

<CONTROL>b

<ESCAPE>

.

<CONTROL>v

<RETURN>

9. Type the following line forty eight times to obtain a printout like Figure 2:

\_ <RETURN>

(that is, an underscore followed by a carriage return).

10. Type: <CONTROL>p

np

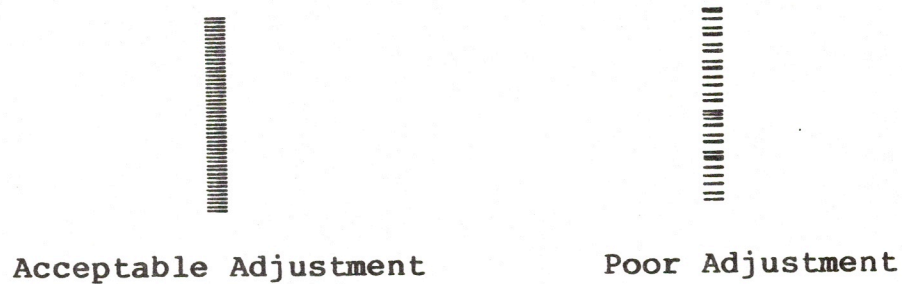
<RETURN>

This should send the file to the printer for printing.

11. If the file does not print, or does not look like Figure 2, make sure you have typed it correctly, starting with step 3.

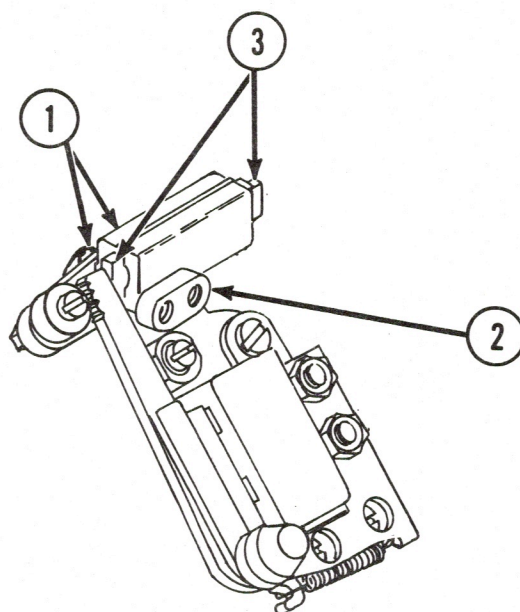
**NOTE:** Here's what this file does. Steps 3 through 5 ensure that the Apple Writer file will be sent to the printer and that a carriage return will be followed by a linefeed. Steps 7 and 8 are a command sequence that sets the printer's linefeed to 1/48 inch. Step 9 is a print file consisting of 48 underscores, which will be printed one under the other. Step 10 sends the file to the printer. The result should look like Figure 2.

12. Compare your printout with Figure 2. If the registration is not acceptable, readjust the idler gear and run the test again.
13. When you are done, turn the printer off to restore normal line feeding. (Otherwise, it will continue to use 1/48 inch linefeeds.)



**FIGURE 2**





**FIGURE 3**

## **PRINT HAMMER ASSEMBLY REMOVAL/REPLACEMENT**

**WHEN TO REPLACE:** If print quality varies irregularly  
and printer has been used for at least 2 years  
and other adjustments fail to correct problem

### **Tools and Materials Needed:**

Small or medium flatblade screwdriver  
3/16 inch wrench  
Ruler

**CAUTION:** When you remove the hammer assembly (that is, the hammer and its black housing), hold the hammer in place. If you let the hammer escape from the assembly, a spring inside the hammer pops out and is easy to lose.

### **To Remove:**

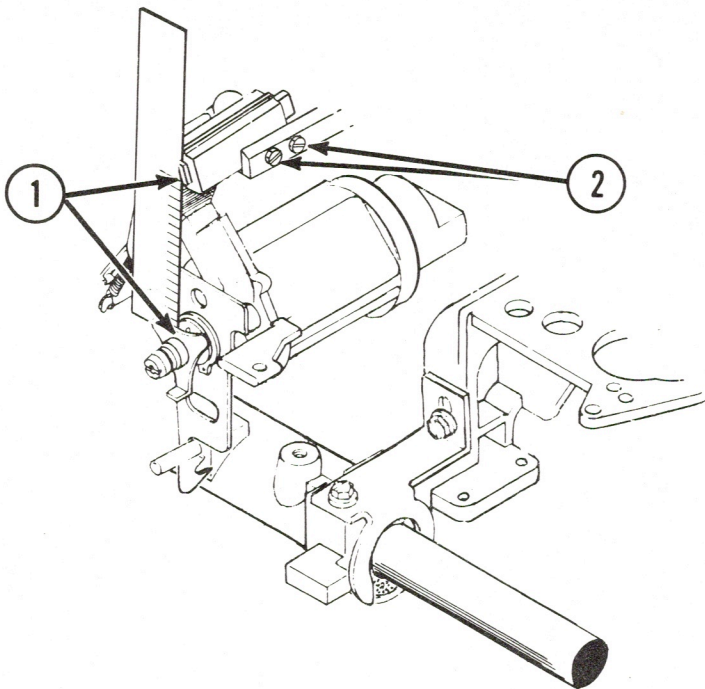
1. Disconnect the AC power cord.
2. Open the access panel.
3. Remove the ribbon cartridge and printwheel.
4. Holding the ends of the print hammer with your thumb and index finger (see Figure 3, #3), remove the two adjustment screws (Figure 3, #1) with either a flatblade screwdriver or a 3/16 inch box wrench.
5. Retrieve the nut plate (Figure 3, #2), which came loose as the screws were removed.
6. Remove the hammer assembly.

### **To Replace:**

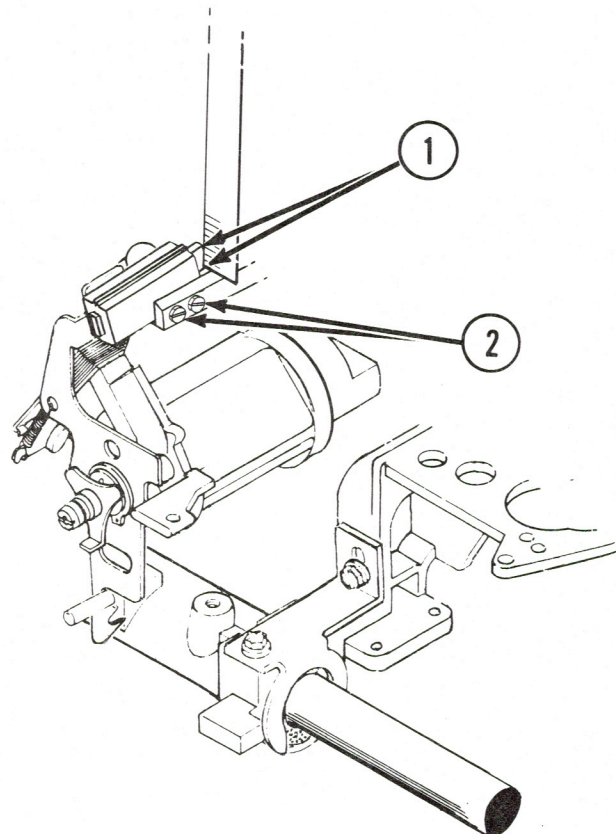
1. Grasping the print hammer between your thumb and index finger, hold the assembly in place and insert the two adjustment screws.
2. Release the print hammer and put the nut plate in position (flat side of plate toward hammer assembly).
3. Tighten the screws part way.

**CONTINUED ON NEXT PAGE**





**FIGURE 4**



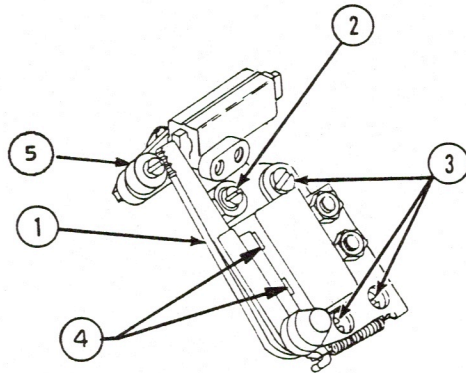
**FIGURE 5**

4. Measure the distance between the printwheel inner hub and the bottom of the print hammer (see Figure 4, #1: the figure shows the view from the platen side).
5. If this distance is not 1 3/4 inches, adjust it by loosening the two adjustment screws (see Figure 4, #2), moving the hammer, and retightening the screws.

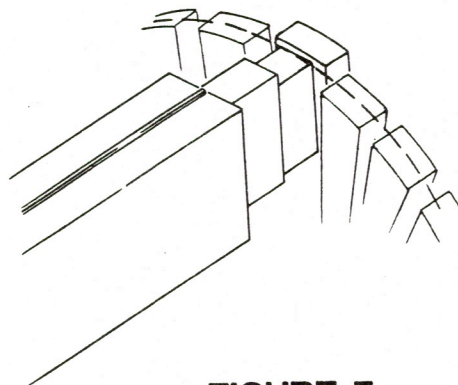
**NOTE:** Don't labor over exact measurement at this point. These adjustments are only rough and will be refined later.

6. Next, rest the ruler on top of the casting above the adjustment screws (on the side where you inserted the screws) and measure the distance to the top of the print hammer (see Figure 5, #1).
7. If the distance is not 1/8 inch, adjust it by loosening the two print hammer adjusting screws (see Figure 5, #2), moving the hammer, and retightening the screws.
8. If you have not already done so, retighten the adjustment screws. **DO NOT OVERTIGHTEN!**
9. Complete the hammer penetration and front and rear stop adjustments (procedures on following pages); then perform the Print Hammer Angle Adjustment.





**FIGURE 6**



**FIGURE 7**

## PRINT HAMMER PENETRATION AND FRONT AND REAR STOP ADJUSTMENTS

**WHEN TO CHECK:** Characters missing or light or  
too heavily inked  
After installing new hammer

### Tools and Materials Needed:

Apple Combination Gauge  
Small flatblade screwdriver  
3/16 inch wrench

The penetration adjustment is critical to print quality. If the penetration is too shallow, the print will be light; if it is too deep, it may puncture the paper and will cause excessive wear and breakage of printwheels, as well as messy printing. To adjust the penetration, you must move the front and rear stops (Figure 6, #2 and #5) out of the way. And of course, that means that you will have to adjust them as your next step.

The hammer armature front stop (Figure 6, #2) limits wear between the armature (Figure 6, #1) and the coil pole pieces (Figure 6, #4). The adjustment is more to reduce wear than to improve print quality.

The rear stop establishes the rest position of the hammer, and it, too, affects print quality. If the hammer rests too far forward, it won't gain enough speed before it hits the printwheel, and the print will be light. If it rests too far back, it may hit the printwheel too hard and cause messy, overinked printing.

### To Inspect:

1. Remove the printwheel and lay it on a flat surface.
2. Inspect the printwheel to see that all spokes are in the same plane and that none are bent or warped. If damaged, replace with a new printwheel.
3. Return the printwheel to the printer and tilt the printwheel assembly toward the platen until it is locked in the print-ready position.
4. Move the armature (Figure 6, #1) against the coil pole pieces (Figure 6, #4), and check that the hammer is deflecting a printwheel spoke about half the thickness of a spoke, as shown in Figure 7. Check this measurement at several locations around the printwheel (simply spin the printwheel with your finger). If adjustment is needed, follow the procedure below.



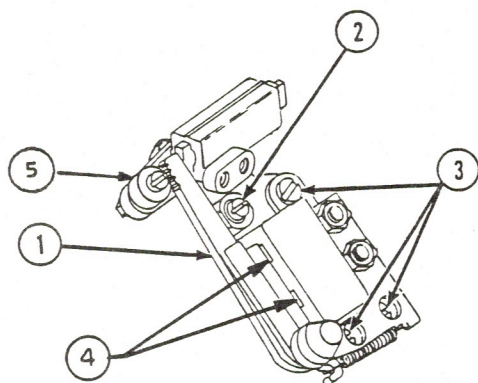


FIGURE 8

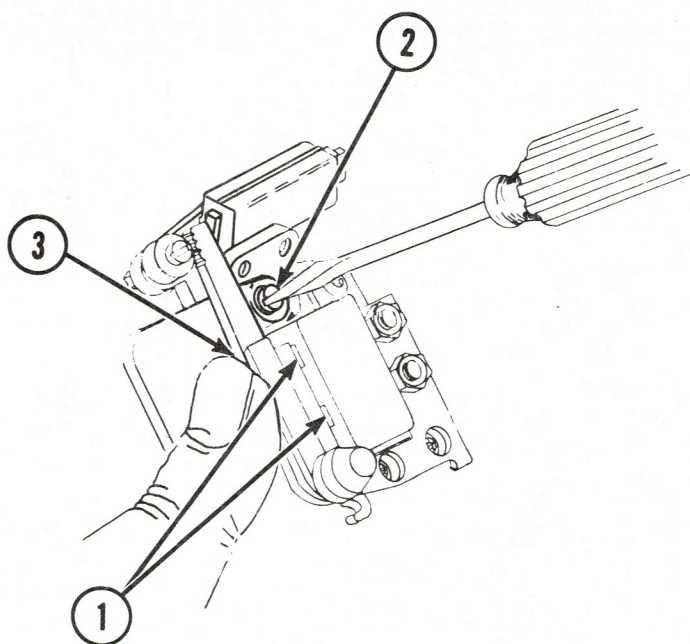


FIGURE 9

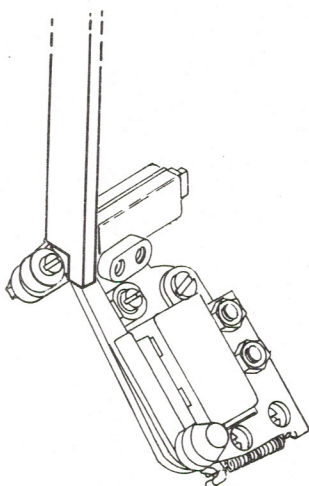


FIGURE 10

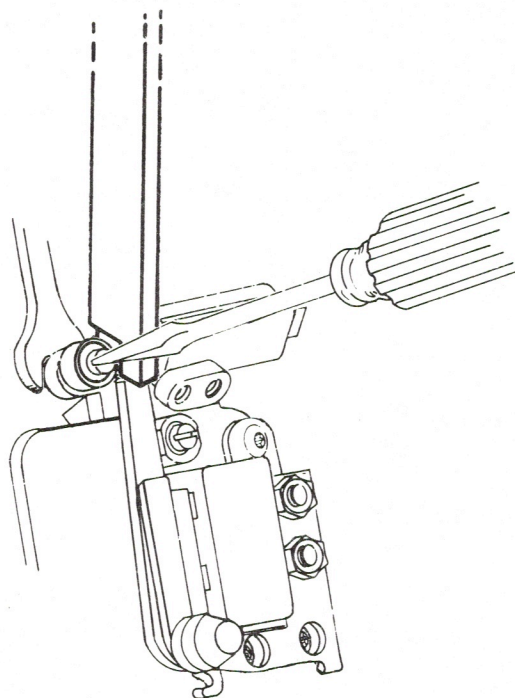


FIGURE 11

### To Adjust Penetration:

1. The front stop (Figure 8, #2) is an eccentric screw held in place by a locking nut. With a 3/16 inch wrench on the nut and a flatblade screwdriver in the eccentric, loosen the eccentric.
2. Move the front stop all the way forward, to allow movement of the armature assembly.
3. With a 3/16 inch wrench and a screwdriver, loosen the lock nut on the rear stop (Figure 8, #5; see Figure 11).
4. Rotate the eccentric to move the rear stop all the way back, to allow movement of the armature assembly.
5. With a flatblade screwdriver, loosen the three armature penetration screws (see Figure 8, #3). **NOTE:** To reach the top screw, hold the print hammer's release lever out of the way.
6. Move the armature assembly forward or backward to achieve the desired penetration of half the thickness of a spoke. Tighten screws and recheck the adjustment.
7. When the adjustment appears satisfactory, adjust the front and rear stops (see next section).

### To Adjust Front Stop:

1. Loosen the front stop (Figure 9, #2) with a 3/16 inch wrench on the nut and a flatblade screwdriver in the eccentric screw.
2. Push the hammer armature (Figure 9, #3) against the coil pole pieces (Figure 9, #1).
3. Using the screwdriver, rotate the front stop so that the hammer armature just touches the coil pole pieces and the front stop. Then carefully tighten the nut on the front stop. **DO NOT OVERTIGHTEN!**

### To Adjust Rear Stop:

1. Push the hammer armature against the coil pole pieces and hold it there.
2. Try to insert the slot at the #3 end of the combination gauge between the rear stop and the armature (see Figure 10). If it fits loosely or not at all, go on to the next step.



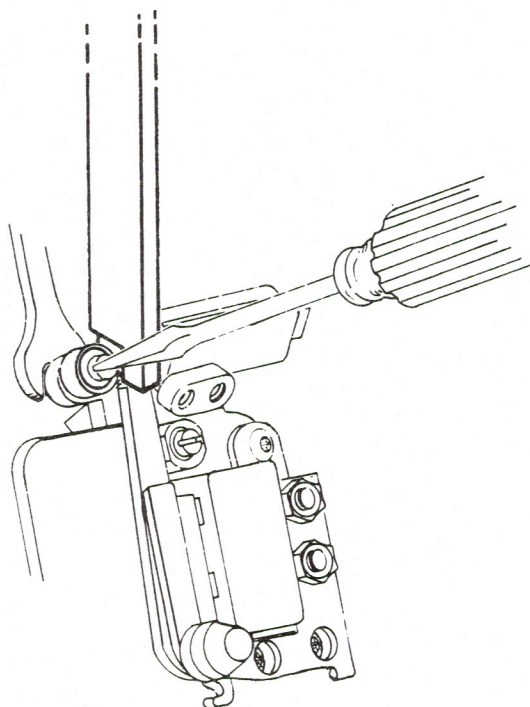


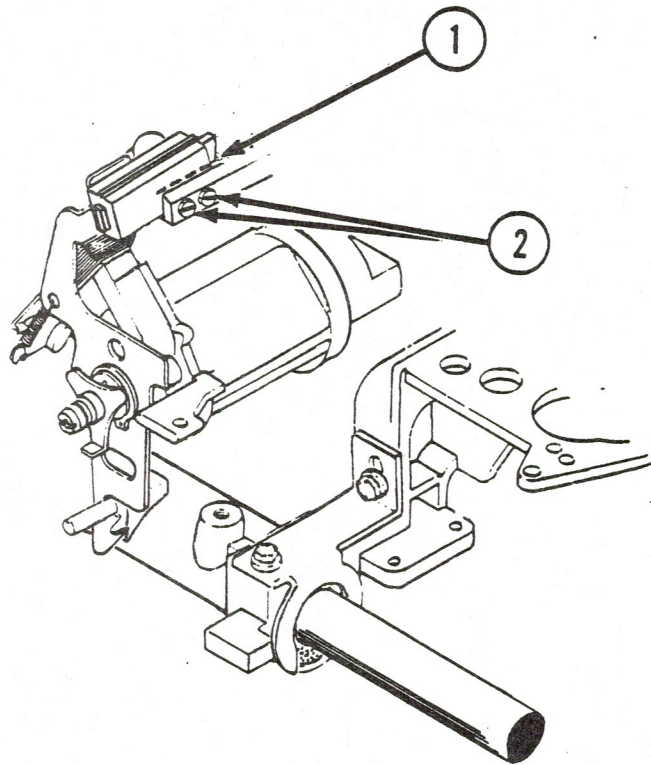
FIGURE 11

3. To adjust the rear stop, use a 3/16 inch wrench and a screwdriver to loosen the rear stop lock nut (see Figure 11).
4. Rotate the rear stop so that the gauge fits.
5. Carefully tighten the rear stop lock nut (DO NOT OVERTIGHTEN) and remove the combination gauge.
6. Perform fine tuning (below).

#### **Hammer Adjustment Fine Tuning**

1. Generate a print sample by running the Terminal Self-Test. If all characters appear too light or dark, refine the penetration adjustment. If the tops or bottoms of characters are light, perform the Print Hammer Angle Adjustment (see next page).
2. Rerun Terminal Self-Test and refine all adjustments until ink density is equal on top, bottom, and both sides of each character.





**FIGURE 12**

## PRINT HAMMER ANGLE ADJUSTMENT

**WHEN TO ADJUST:** Tops of letters missing (raise rear of hammer)  
Bottoms of letters missing (lower rear of hammer)

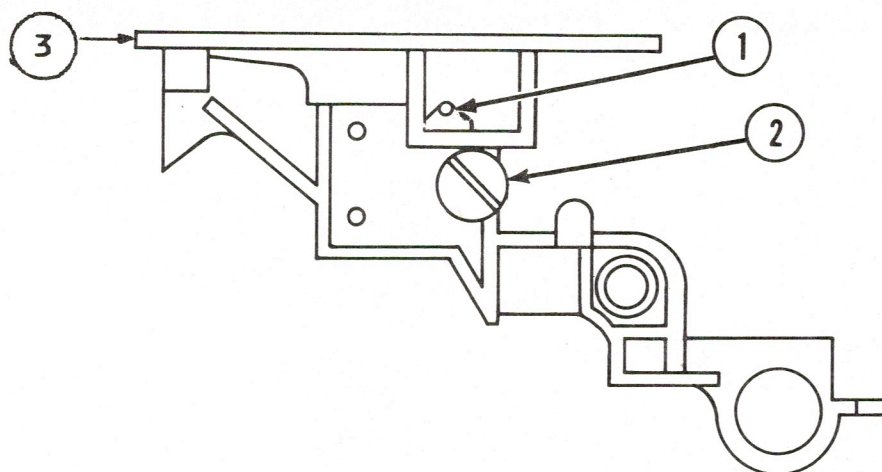
### Tools and Materials Needed:

Small flatblade screwdriver  
3/16 inch wrench  
Pencil

**NOTE:** For best results, use a Proportional Space printwheel for testing this adjustment: the greater size of the characters creates a "worst case" condition which makes any misadjustment easy to see.

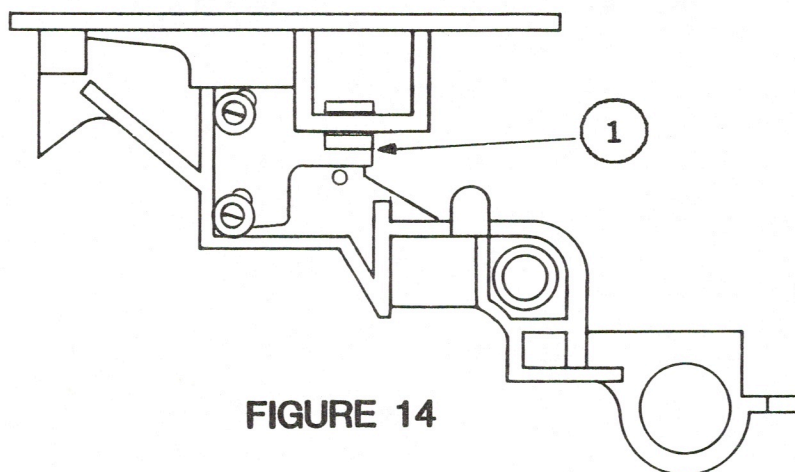
1. Generate a print sample by running a Terminal Self-Test (see **Basics**). If the tops or bottoms of letters are missing or light, continue this procedure.
2. Draw a reference line on the hammer housing so that you can see your adjustments (see Figure 12, #1).
3. Remove the ribbon cartridge.
4. Loosen the adjustment screws (Figure 12, #2).
5. If the tops of letters are missing, raise the rear of the print hammer; if the bottoms of letters are missing, lower the rear.
6. Tighten the adjustment screws.
7. Replace the ribbon cartridge and run another Terminal Self-Test to check adjustment.
8. Repeat steps 3-7 until print quality is optimum.



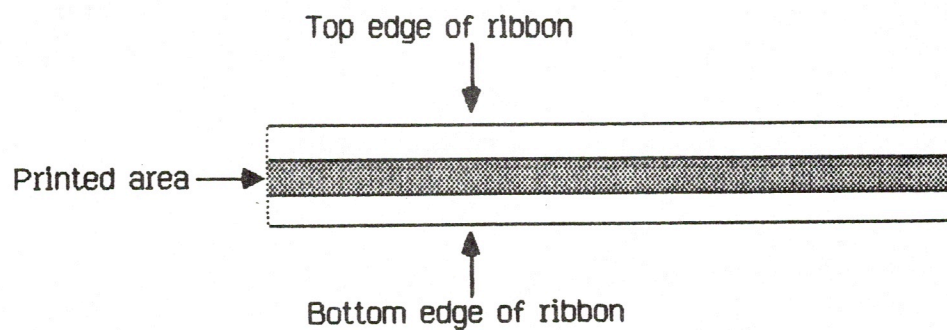


**FIGURE 13**

RIGHT SIDE VIEW OF CARRIAGE ASSEMBLY



**FIGURE 14**



**FIGURE 15**

## RIBBON SUPPORT PLATE ADJUSTMENT

**WHEN TO ADJUST:** Tops or bottoms of characters not printing  
(SYMPTOMS) **and** type too high or low on ribbon (see  
explanation below)

### Tools and Materials Needed:

1/4 inch wrench  
Medium flatblade screwdriver

If some letters are getting insufficient inking at top or bottom, check the ribbon first. The printwheel may be hitting too high or too low on the ribbon, and you can tell that by simple inspection: the printwheel should be hitting the middle of the ribbon (see Figure 15). If the printwheel is hitting too close to the top or bottom edge of the ribbon, the tops or bottoms of characters will be lost.

To correct this, you can adjust the ribbon position -- by adjusting the ribbon support plate (Figure 13, #3), which the ribbon rests on. This is the only situation in which you would adjust the ribbon support plate.

There are two arrangements of the ribbon support plate. Older models have a metal **eccentric** (Figure 13, #2) and **up-stop** (Figure 13, #1), which adjust and stabilize the height of the plate. Newer models use a **plastic bracket** (Apple P/N 970-0626; Figure 14, #1), which should be retrofitted onto older models if the metal up-stop breaks. Adjustment procedures for the up-stop and eccentric are given first; those for the plastic bracket, second.

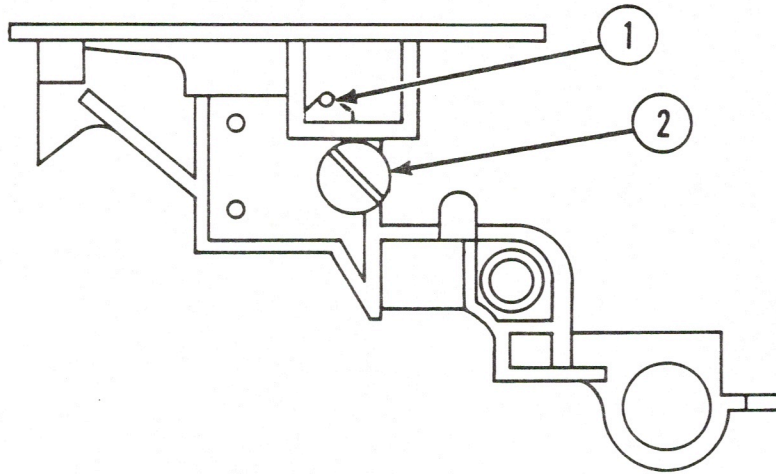
### TO CHECK ADJUSTMENT

**NOTE:** For best results, use a Proportional Space printwheel for testing this adjustment: the greater size of the characters creates a "worst case" condition which makes any misadjustment easy to see.

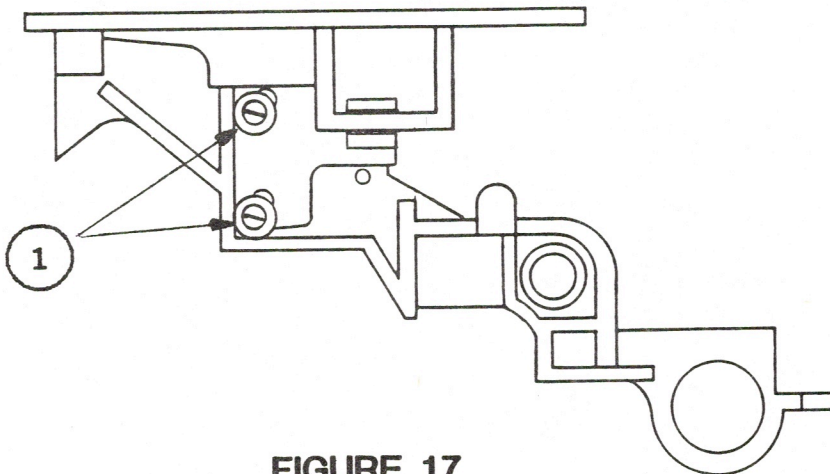
1. Obtain a print sample by performing a Terminal Self-Test, printing at least one full line of the complete character set.
2. Remove the ribbon cartridge and look at the used section of ribbon. The printwheel should be hitting exactly in the middle of the ribbon (see Figure 15). If the printwheel is hitting higher or lower than that, adjust the ribbon support plate.

CONTINUED ON NEXT PAGE





**FIGURE 16**



**FIGURE 17**

## TO ADJUST

### For Models with Metal Up-Stop

**CAUTION:** The up-stop breaks off easily if its nut is overtightened.

1. Disconnect the AC power cord.
2. Remove the ribbon cartridge.
3. Loosen the nut on the back of the up-stop with a 1/4 inch wrench. Rotate the up-stop to its highest position. (See Figure 16, #1.)
4. Use a flatblade screwdriver in the eccentric (Figure 16, #2) to raise or lower the support plate. **If the print is too high on the ribbon**, the ribbon is too low, so raise the support plate.

**If print is too low on ribbon**, ribbon is too high, so lower the support plate.

5. When the support plate is properly adjusted, lower the up-stop so that it touches the support plate, and carefully tighten the nut. (**DO NOT OVERTIGHTEN.**)
6. Check the adjustment (see "TO CHECK ADJUSTMENT," above); readjust the support plate as necessary.

### For Models with Plastic Bracket

1. Disconnect the AC power cord.
2. Remove the ribbon cartridge.
3. Loosen but do not remove the two bracket adjustment screws (Figure 17, #1).
4. **If the print is too high on the ribbon**, raise the support plate by pulling the plate upwards and then tightening the bracket screws.

**If print is too low on ribbon**, lower the support plate by pushing down on it and then tightening the bracket screws.

5. Check the adjustment (see "TO CHECK ADJUSTMENT," above); readjust the support plate as necessary.





## **PLATEN HEIGHT AND DEPTH ADJUSTMENT**

**WHEN TO CHECK:** Tops or bottoms of characters not printing;  
(SYMPTOMS) ribbon support plate and hammer adjustments do not solve problem

Print quality lighter at one side of page

### **Tools and Materials Needed:**

Torx screwdriver (see Tools section of Basics)  
Apple Combination Gauge  
5/8 inch open-end wrench or duckbill pliers  
or needlenose pliers  
Medium flatblade screwdriver

You will almost never need to adjust the platen. It is fitted with tamper-proof Torx screws to discourage users from changing the adjustments, and in normal use the adjustments are not likely to shift.

However, if the tops or bottoms of letters are not printing, and the print hammer or ribbon support plate adjustments do not remedy the problem, check the platen height. If the platen is too high, the bottoms of letters will not print; if it is too low, the tops will be missing. (See Table 1 for print samples.)

If the print quality varies from the left side to the right side of the printed line, uneven platen depth almost certainly is the cause.

If you do not have the special Torx screwdriver that fits the platen adjustment screws, you will have to loosen and tighten the screws with pliers.

**NOTE:** Do not adjust the platen unless you are sure that it is necessary: once you change the platen adjustment, you increase the chances that it will need to be adjusted in the future.

### **A. HEIGHT**

1. Disconnect the AC power cord.
2. Remove the top cover.

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FIGURE 18

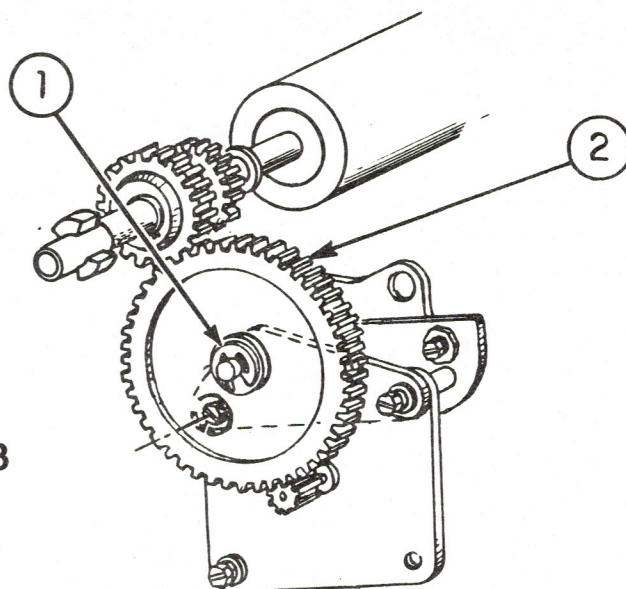


FIGURE 19

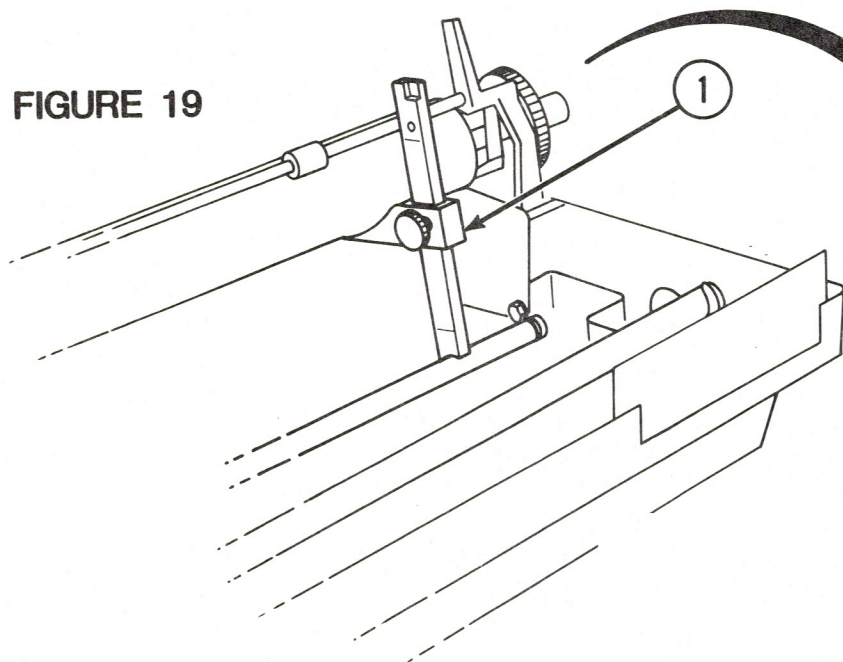
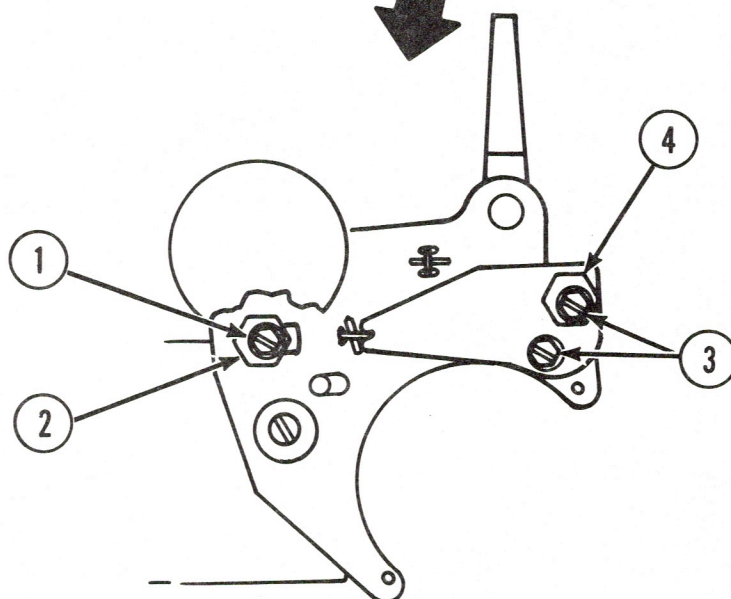
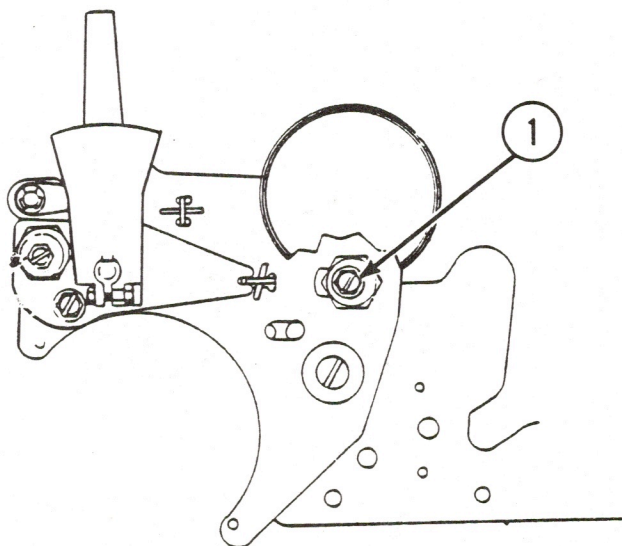


FIGURE 20



3. Remove the idler gear (Figure 18, #2) by removing the E-clip (Figure 18, #1) and pulling the gear off.
4. Move the paper thickness lever (left side, behind platen) to full forward position.
5. Move the carriage assembly to the center of the printer.
6. Set the combination gauge slide to the #2 position and place it between the rear guide shaft and the platen, near the right side of the platen. (See Figure 19, #1.)
7. If there is a space between the gauge slide and the platen, or if the gauge slide does not fit under the platen, the platen is misadjusted and you should continue with step 8. Otherwise, skip to step 10.
8. Loosen the lock screw (Figure 20, #1) just enough to allow rotation of the 5/8 inch eccentric nut (Figure 20, #2). (Rotating the eccentric changes the height of the platen.)
9. Now rotate the eccentric (with 5/8 inch wrench or pliers) until the surface of the platen just touches the combination gauge slide. Then tighten the lock screw.
10. Repeat steps 6-9 for the left side of the platen. (See Figure 21, #1.)
11. Check the adjustments (see below, Section C): Adjusting the platen height may cause changes in the platen depth adjustment. Be sure to check that too. (See next page.)



**FIGURE 21**



FIGURE 22

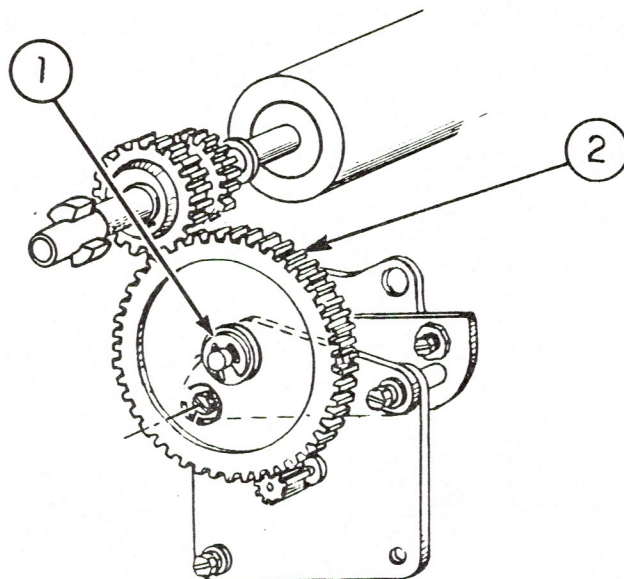


FIGURE 23

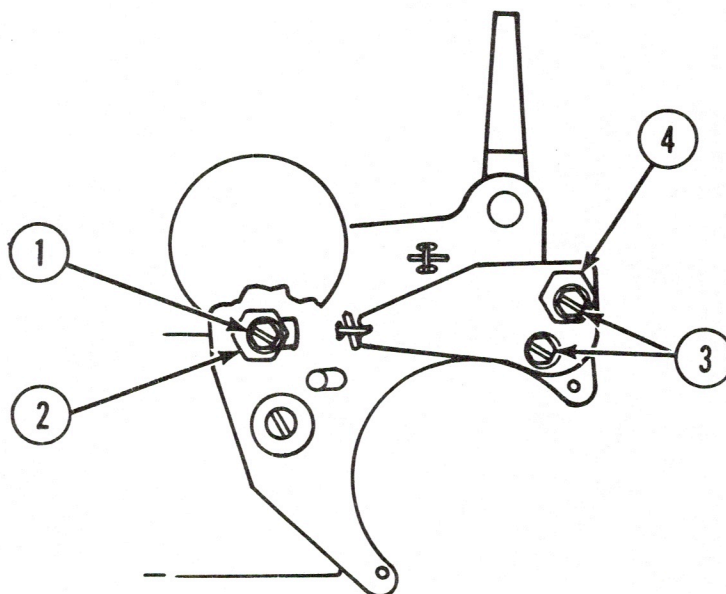
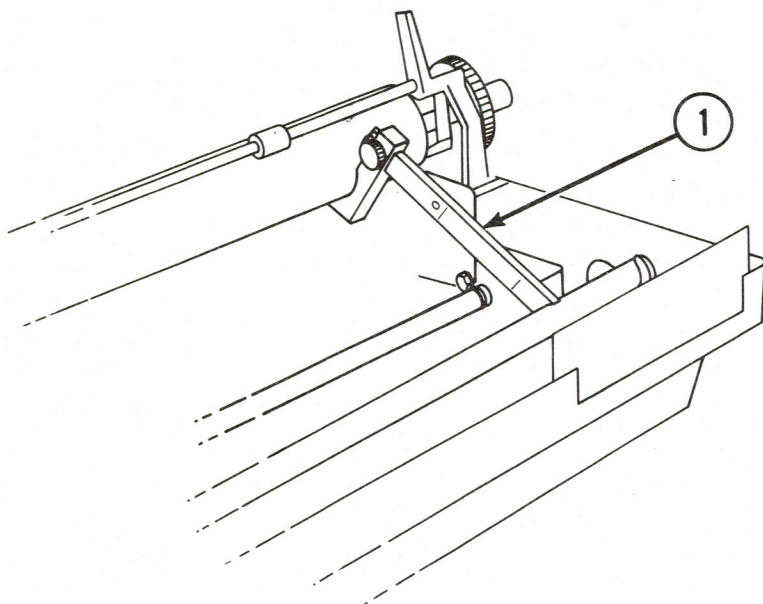


FIGURE 24

## B. DEPTH

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Remove the idler gear (Figure 22, #2) by removing the E-clip (Figure 22, #1) and pulling the gear off.
4. Move the paper thickness lever (left side, behind platen) to full forward position.
5. Move the carriage assembly to the center of the printer.
6. Set the combination gauge to the #3 position and insert it on the right side of the printer between the front shaft and the platen. (See Figure 23.)
7. If the gauge fits too loosely or not at all, loosen the **two** lock screws (Figure 24, #3) just enough to allow rotation of the rear 5/8 inch eccentric nut (Figure 24, #4.) **IMPORTANT: YOU MUST LOOSEN BOTH SCREWS. OTHERWISE YOU MAY SHEAR OFF THE BOTTOM SCREW WHEN YOU TRY TO ADJUST THE ECCENTRIC.**
8. Rotate the eccentric (with 5/8 inch wrench or duck-bill pliers) until the platen's front surface just touches the combination gauge slide. Then tighten both lock screws.
9. Remove the combination gauge and replace it on the left side.
10. Repeat steps 6 - 8 for the left side of the printer.
11. Check the adjustments (see below): Adjusting the platen depth may cause changes in the platen height adjustment.

## C. CHECKING THE ADJUSTMENTS

**NOTE:** For best results, use a Proportional Space printwheel for testing these adjustments: the greater size of the characters creates a "worst case" condition which makes any platen height misadjustment easy to see.

1. Recheck the platen height and depth adjustments with the combination gauge. Make additional adjustments as necessary.

**CONTINUED ON NEXT PAGE**



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## **PLATEN LOCATOR SLEEVE ADJUSTMENT**

**WHEN TO ADJUST:** Horizontal registration irregular;  
in boldface or shadow printing, uneven  
character width or two letters visible  
instead of one bold letter

### **Tools and Materials Needed**

.072 inch six-flute spline wrench  
.001 - .003 inch feeler gauges

The platen is the long black rubber roller that supports the paper. The platen locator sleeve (Figure 25, #4) is on the right side of the platen, near the tractor gear (Figure 25, #2). There should always be a small amount of end play (.001 to .003 inches) between the locator sleeve and the tractor gear: if there is too little play, the sleeve will bind and interfere with line feeding. On the other hand, if there is too much play, the platen may shift from side to side, so that the horizontal position of each print column will shift from line to line.

**NOTE:** You can measure the end play between the locator sleeve and the tractor gear, or between the bearing sleeve (Figure 25, #5) and the locator sleeve, as shown in Figure 25: the result will be the same.

### **To Check Adjustment:**

1. Remove the top cover.
2. Pull the paper bail forward (away from the platen).
3. Remove the platen by placing one hand on each end, pushing down on the platen release levers (one on each side) with your thumbs, and lifting the platen free.
4. Hold the platen vertical, so that the tractor gear (Figure 25, #2) is at the top.
5. With your fingers, twirl the bearing sleeve (Figure 25, #5) in one direction and the platen locator sleeve (Figure 25, #4) in the other direction. At some point they will probably bind (resist movement). Move them in the opposite direction until you find the point at which they are loosest. (If you cannot move them at all, they are too tight and should be adjusted.)

**CONTINUED ON NEXT PAGE**



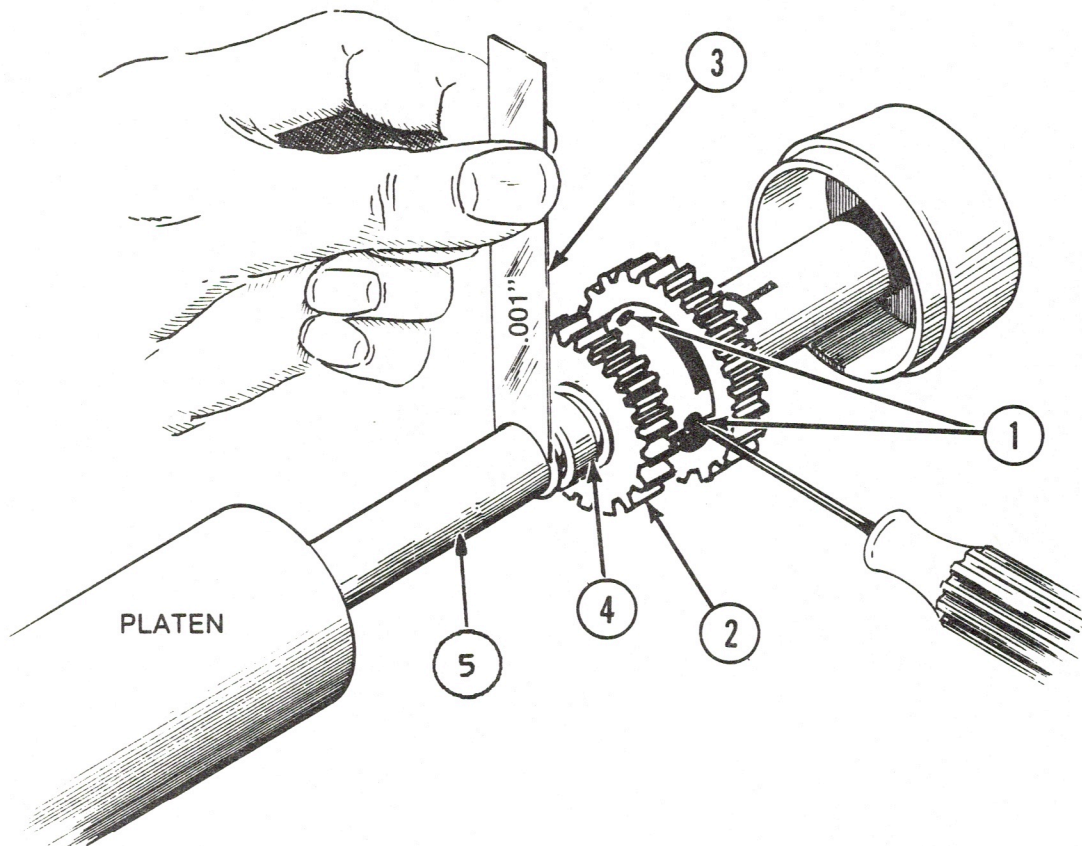


FIGURE 25

6. At the loose point of the two sleeves, try to insert a .004 inch feeler gauge. If you **can** insert it, the sleeves are too loose and should be adjusted. If you **cannot** insert the .004 inch gauge, try to insert a .001 inch gauge. If you can insert it, the sleeves are well adjusted. If you cannot insert it, the sleeves are too tight and should be adjusted.

#### To Adjust:

1. Hold the platen upright so that the tractor gear (Figure 25, #2) is at the top.
2. Find the point at which the two sleeves are loosest. If you can, insert a .001 or .0015 inch feeler gauge between the sleeves (see Figure 25). (If you can't, go on to step 3).
3. Loosen the two collar set screws (Figure 25, #1) with the .072 inch six-flute spline wrench. (Insert the .001 or .0015 inch feeler gauge between the sleeves at the loosest point between them, if you have not already done so.)
4. Let gravity push the tractor gear against the feeler gauge; then tighten the set screws.
5. Remove the feeler gauge and try to twirl the bearing sleeve (Figure 25, #5). A small amount of binding is acceptable, but you should be able to overcome it with a little pressure from your fingers. If the sleeve binds strongly, loosen the collar set screws and repeat the adjustment using a .002 inch feeler gauge.
6. When the .001 or .0015 feeler gauge fits and the bearing sleeve does not bind badly when twirled, test the gap with a .004 inch gauge. If the larger gauge fits, the gap is too large. If you cannot readjust the sleeves to within tolerance (.001 to .003 inch gap), replace the platen or the bearing sleeve.
7. Return the platen and platen knob.
8. Defeat the top cover interlock switch.
9. Load paper and run the Terminal Self-Test as a check. Make sure the spacing between lines is even: if not, loosen the sleeve. Also run the Horizontal Registration Test (see **Take-Apart** Section).





Apple Daisy Wheel Printer  
Technical Procedures

Section 5

Preventive Maintenance

Contents:

Introduction.....	5.3
Cleaning.....	5.5
Lubrication - One Year Cycle.....	5.7
Lubrication - Two Year Cycle.....	5.9
Special Maintenance for Harsh Environments.....	5.11





## A. INTRODUCTION

Properly maintained, the Apple Daisy Wheel printer will give excellent service for many years. The following table summarizes the manufacturer's preventive maintenance requirements.

**Operator or field service duties — perform as required:**

1. Clean ribbon shield
2. Clean printwheel
3. Clean covers
4. Clean platen, feed rollers, paper bail rollers

**Field Service — perform as required:**

1. Replace felt wipers
2. Lubricate feed roller shafts
3. Check print quality by running Terminal Self-Test (see **Basics**).

**Field Service — once a year or every 2000 operating hours**

1. Clean and lubricate carriage drive shafts
2. Lubricate felt pad on paper feed idler gear stud
3. Lubricate carriage felt wipers

**Field Service — once every two years or 4000 operating hours**

1. Lubricate platen sleeve

**Field Service — required only in very harsh environments**

1. Clean print hammer
2. Lubricate drive belt pulley

### NOTES:

1. These procedures are designed for normal environments. Printers in exceptionally harsh operating environments may require different or more frequent preventive maintenance.
2. Use only the recommended types of cleaners, lubricants, etc.
3. Clean plastic parts only with a low residue cleaner such as rubbing alcohol; do not use high residue cleaners such as soaps; **NEVER** use solvent based cleaners (such as those containing toluene), as they will destroy the plastic.



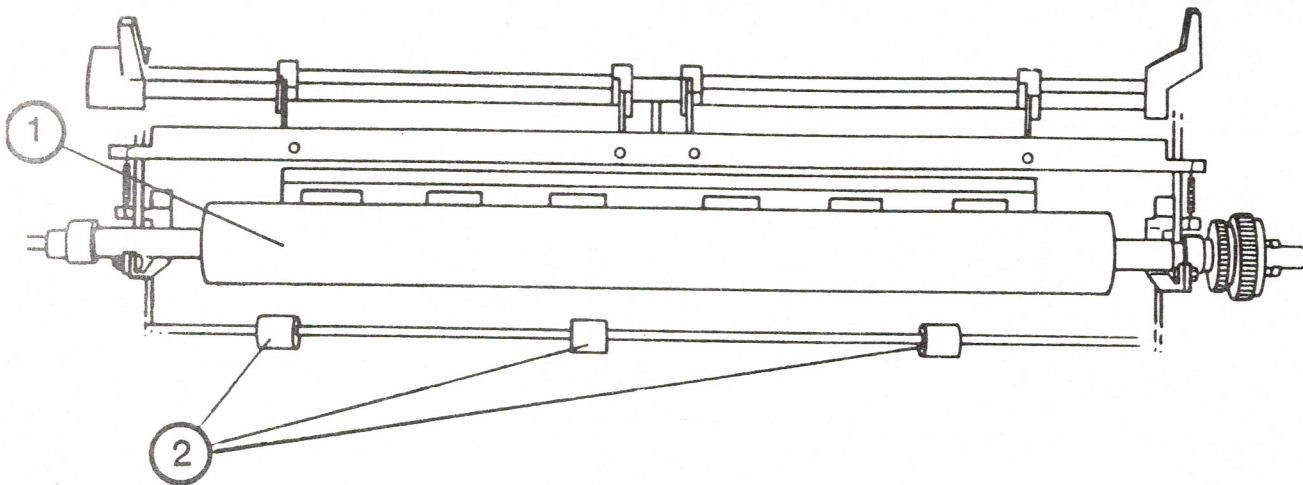


FIGURE 1

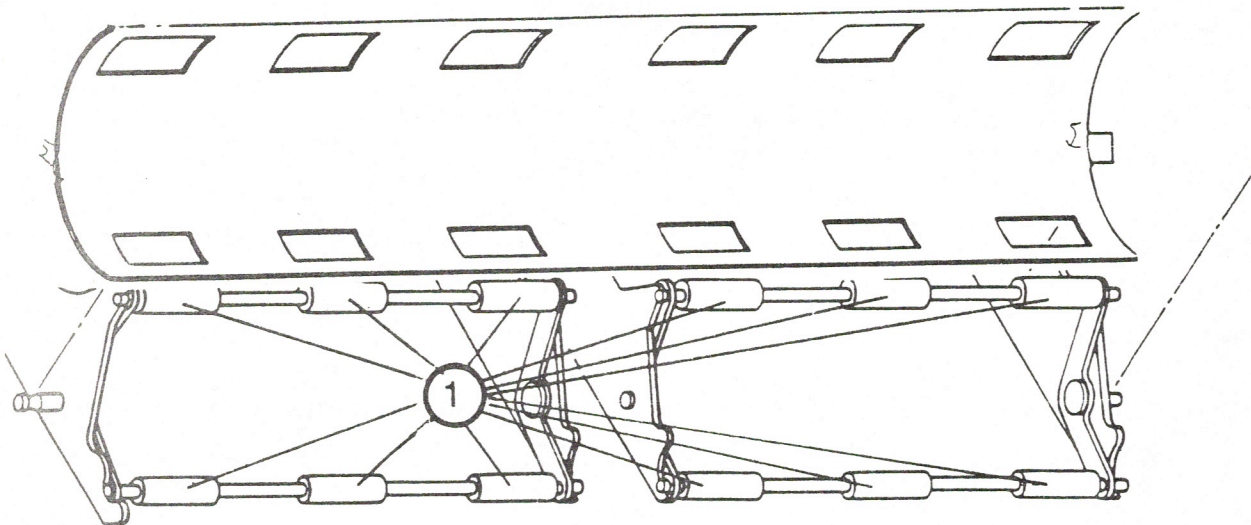


FIGURE 2

## **B. CLEANING**

### **Printwheel:**

1. Remove printwheel.
2. Soak printwheel in low residue cleaner such as alcohol.
3. Use medium stiff brush to clean (gently).
4. Thoroughly rinse in clean water and dry.
5. Reinstall when dry.

**NOTE:** DWP's that use a fabric-based ribbon may require more frequent printwheel cleaning.

### **Platen, Feed Rollers, Paper Bail Rollers (Rubber Parts):**

1. Remove top cover, ribbon cartridge and printwheel.
2. Remove platen.
3. Lift platen cradle out of the way (see Figure 2).
4. Moisten a soft cloth with Fedron platen cleaner and clean platen (Figure 1, #1), paper bail rollers (Figure 1, #2), and feed rollers (Figure 2, #1).

**CAUTION: FEDRON SHOULD BE USED ONLY IN A WELL VENTILATED AREA. DO NOT USE FEDRON ON PLASTIC PARTS.**

**NOTE:** It is important to use an approved platen cleaner, such as Fedron brand. The platen must offer a specific resiliency to the print hammer. Platen cleaner restores resiliency; other solvents will harden the platen and cause impaired printer performance.

### **Ribbon Shield and Metal Parts:**

1. Remove top cover, ribbon cartridge, printwheel and platen.
2. Clean the ribbon shield and other metal parts with a soft rag and a safe degreasing agent (such as isopropyl alcohol or Freon).



FELT WASHER  
LUBE POINT

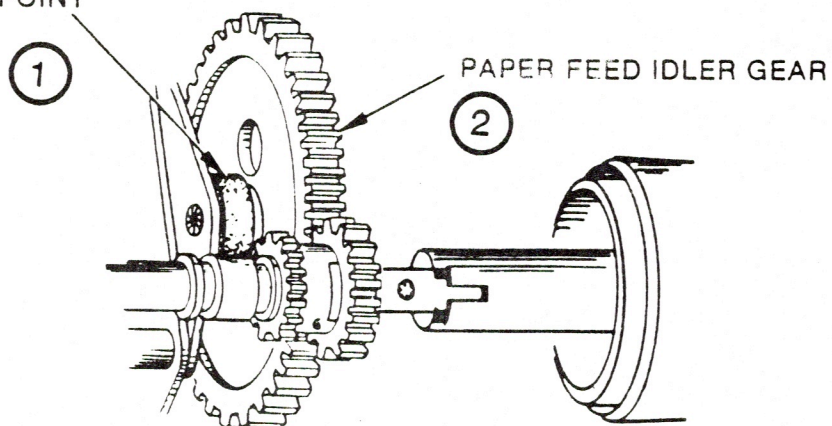


FIGURE 3

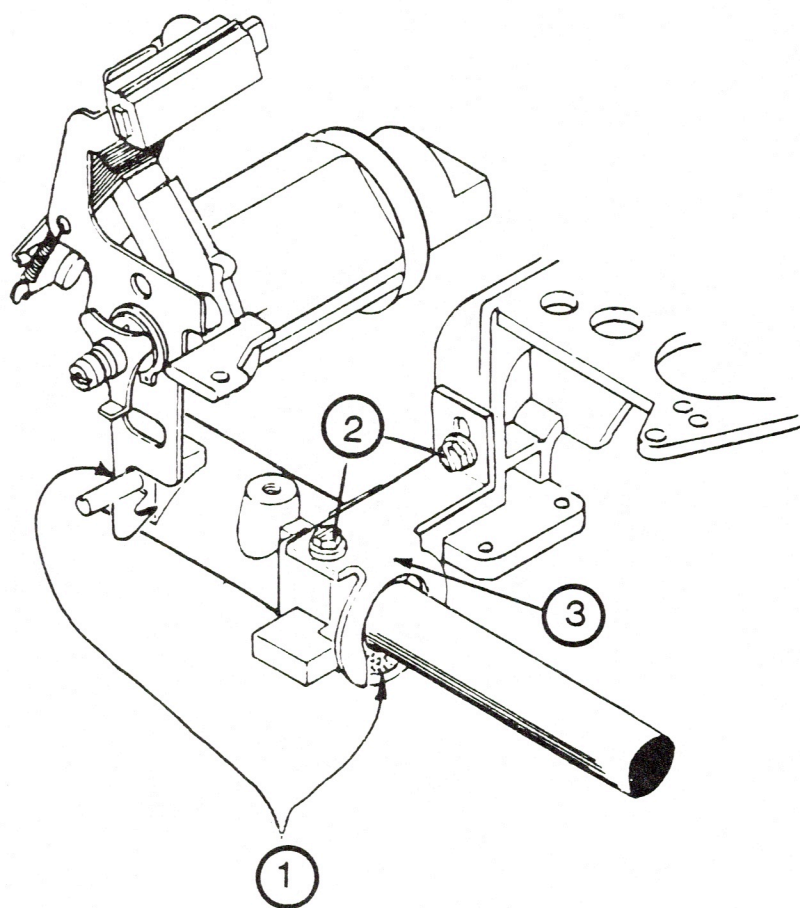


FIGURE 4

### **C. LUBRICATION - ONE YEAR CYCLE**

Once every year or every 2000 hours, perform the following lubrications:

#### **1. Paper Feed Idler Gear Stud:**

Once a year, or every 2000 operating hours, lubricate the felt washer behind the paper feed idler gear (see Figure 3, #1) with ten drops of Tellus #46 oil. Wipe off any excess oil. Do not lubricate the idler gear itself (Figure 3, #2).

#### **2. Carriage Drive Shaft and Felt Wipers:**

There are two felt wipers on the rear carriage guide shaft (see Figure 4, #1). Once a year, or every 2000 hours:

- a) Wipe the carriage drive shaft clean with a soft cloth moistened with isopropyl alcohol or freon.
- b) Use a 3/16 inch wrench and/or a small screwdriver to remove the two screws (Figure 4, #2) on the retaining clamp (Figure 4, #3) on each side of the carriage assembly (Figure 4 shows only one side). Inspect the felt wiper. If very worn or dirty, remove and replace it. Otherwise, go on to step c.
- c) Lubricate both left and right wipers with Tellus #46 oil. If wipers are new, use 10 drops on each; if not new, use 5 drops each.
- d) Slide the carriage assembly back and forth to lubricate the shaft.
- e) Wipe off excess oil with a clean dry cloth and repeat step d.

#### **3. Clean and lubricate the front carriage guide shaft:**

Once a year, or every 2000 operating hours:

- a) Clean the front guide guide shaft with a soft cloth moistened with isopropyl alcohol or freon.
- b) Apply 3 drops of Tellus #46 oil with a cotton swab.
- c) Slide the carriage back and forth to lubricate the shaft.
- d) Wipe off excess oil with a clean dry cloth and repeat step c.



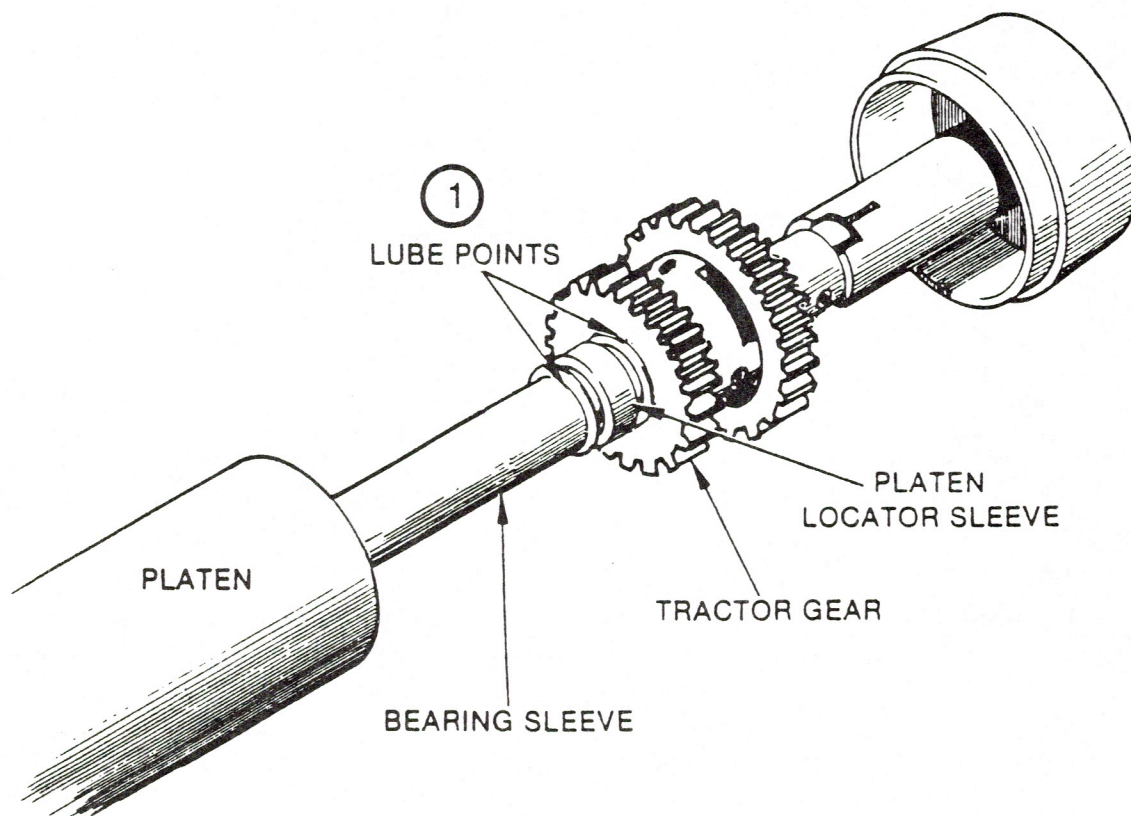


FIGURE 5

#### **D. LUBRICATION - TWO YEAR CYCLE**

Once every two years, perform the following lubrication:

##### **Platen Sleeve Bearings:**

1. Remove top cover and platen.
2. Place two drops of Tellus #46 oil at one end of the platen sleeve (see Figure 5, #1), and hold the platen vertical so that the oil flows down the shaft.
3. Twirl the sleeve to distribute the oil evenly; then wipe off excess oil. Avoid getting oil on the platen surface.
4. Repeat steps 2 and 3 for the other end of the platen.
5. Replace platen and top cover.



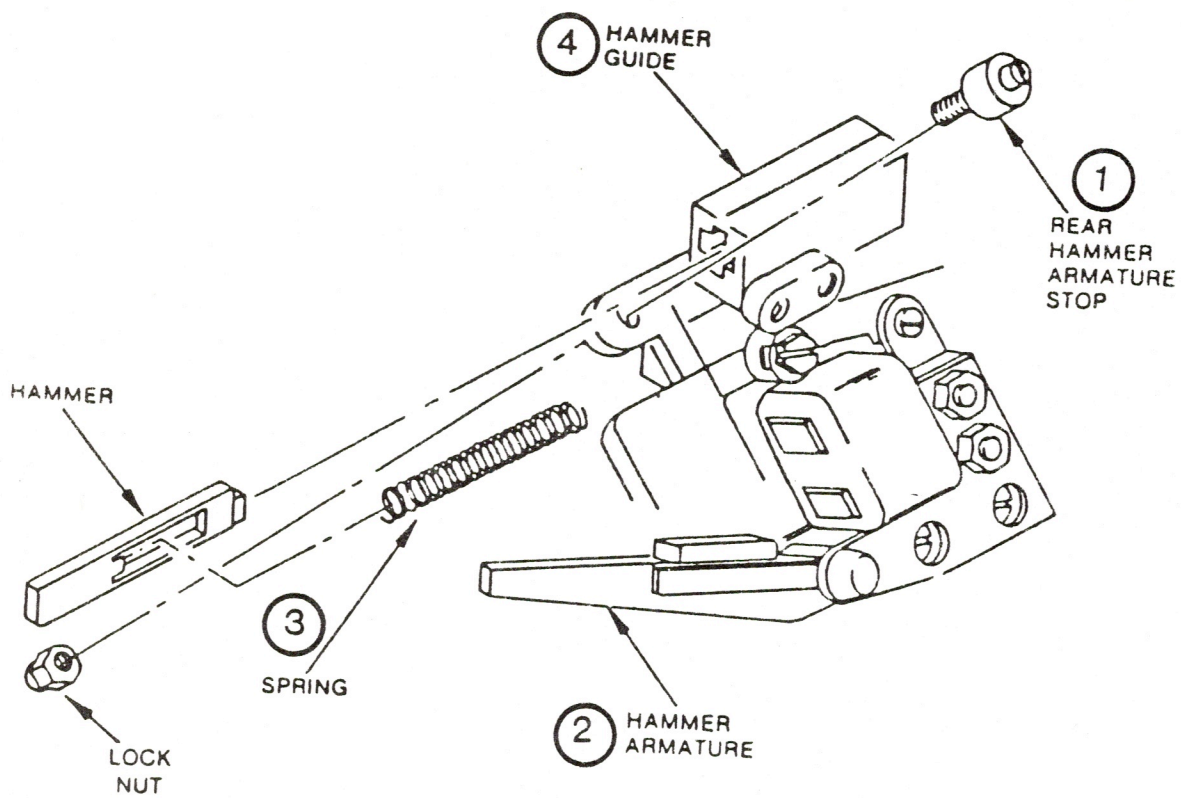


FIGURE 6

## E. SPECIAL MAINTENANCE FOR HARSH ENVIRONMENTS

Where printers are subjected to airborne dirt and corrosive substances, the print hammer may need occasional cleaning and lubrication. This is not necessary under normal operating conditions.

1. Disconnect AC power cord. Remove the access cover and ribbon cartridge. Unplug the connector on the hammer coil.
2. Remove the rear hammer armature stop (Figure 6, #1) and allow the armature to pivot toward the front of the printer (toward the operator) (see Figure 6, #2).
3. Being careful to hold on to the hammer spring (Figure 6, #3) so it will not be lost, remove the print hammer from the hammer guide (Figure 6, #4) by sliding it out toward the front of the printer. Remove and retain the spring.
4. Clean both the hammer and the inside of the hammer guide with isopropyl alcohol or Freon solvent. Use a cotton swab moistened with solvent to clean inside the hammer guide. DO NOT USE SPRAY SOLVENTS.
5. Carefully replace the spring inside the hammer and install the hammer in the hammer guide. (Note that the face of the hammer is wedge-shaped. Install the hammer with the wide end of the wedge up.)
6. Pivot the hammer armature against the print hammer coil and reinstall the rear stop and locknut. Reconnect the hammer coil connector.
7. Adjust the print hammer rear stop (hammer armature rear stop) (see **Print Quality Adjustments**).
8. Replace the ribbon cartridge and the access cover.
9. Perform terminal self-test to check print quality and make any necessary hammer adjustments.





# Apple Daisy Wheel Printer Technical Procedures

## Section 6

### Forms Tractor

#### Contents:

Introduction.....	6.3
Parts List.....	6.3
Recommended Special Tools.....	6.3
Notes on Specific Repairs:	
Timing Belt Replacement/Adjustment.....	6.5
Tractor Assembly Replacement.....	6.7
Paper-out Sensor Replacement/Adjustment.....	6.7
Cleaning and Lubrication.....	6.7

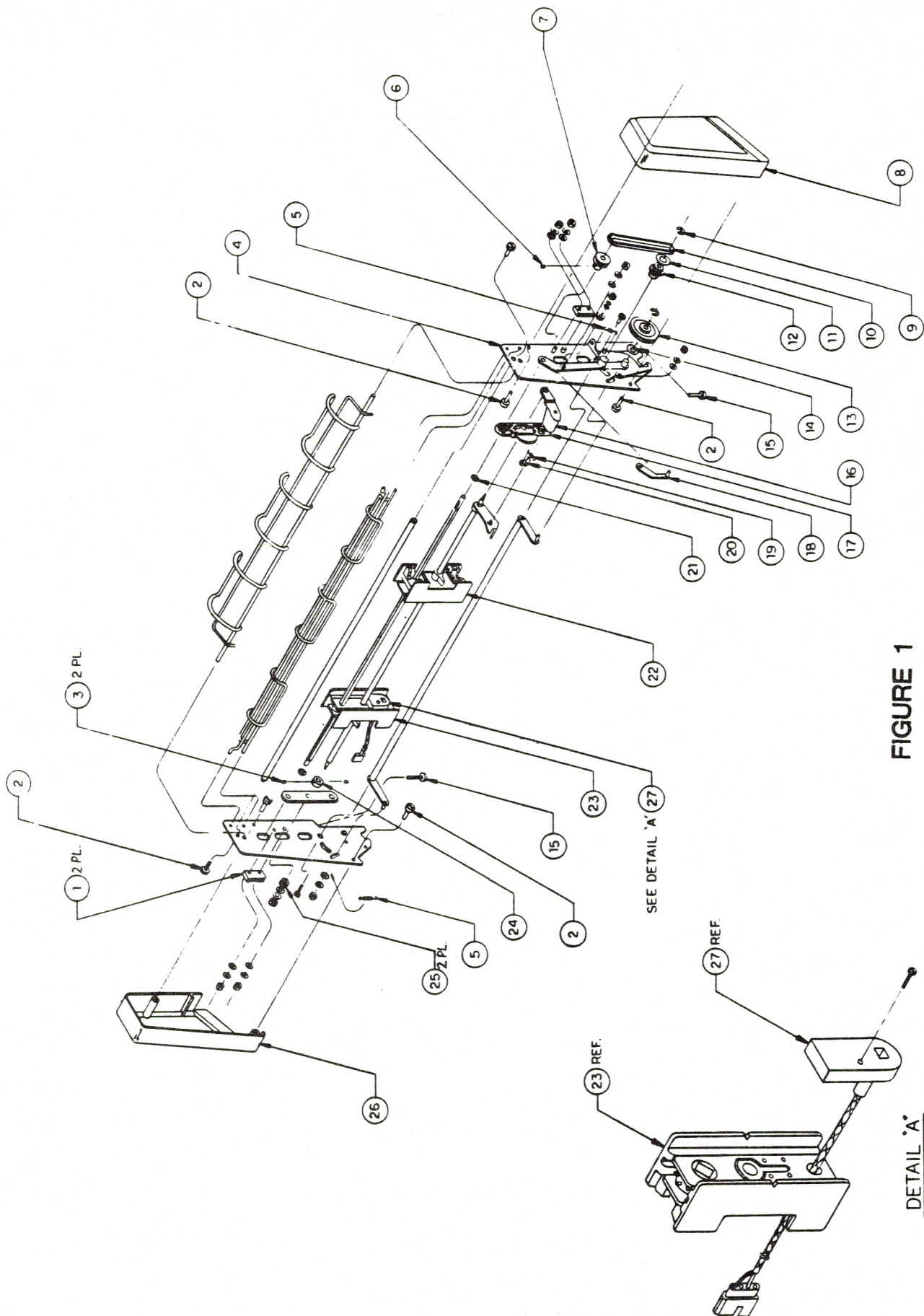


FIGURE 1



## INTRODUCTION

The exploded drawing on the left shows the DWP Forms Tractor (DWP-FT). All parts available to Level 1 Service Centers are listed below, and are pointed out on the drawing. Replacement of these parts is optional at Level 1: there is no spares kit, and any failed DWP-FT may be shipped to the Level 2 Service Center for repair, using Apple P/N 668-94510 (defective unit) and standard RMA procedure for "out-of-box failures". If you choose to do repairs, contact your Level 2 Service Center for prices of piece parts.

The table below lists the parts on the diagram, ordered by their number on Figure 1. Special tools you will need for piece repairs are listed below the table.

Table 1

<u>Number</u>	<u>Description</u>	<u>Apple Part No.</u>
1	Rack, Adjust	970-0500
2	Screw, #8-32 x 1/2 SEMS	970-0562
3	Scr, #6-32 x 1/8 Splined	970-0525
4	Side Plate Assy, R.H.	699-0122
5	Spring, Extension	970-0517
6	Scr, #8-32 x 1/8 Splined	970-0526
7	Pulley, 30 Groove	970-0516
8	Cover, R.H.	970-0548
9	E-Ring, 5133-37	970-0524
10	Timing Belt	970-0537
11	Shoulder, Pulley	970-0511
12	Gear, Pulley	970-0515
13	Gear, Idler	970-0514
14	Washer, Thrust	970-0538
15	Stud, Adjust	970-0503
16	Lever, Adjust	970-0513
17	Plate, Ratchet	970-0512
18	Arm, Tension	970-0510
19	Spring, Extension	970-0519
20	Pawl, Ratchet	970-0509
21	Washer, Thrust	970-0534
22	Tractor Assembly, R.H.	699-0123
23	Tractor Assembly, L.H.	699-0124
24	Collar	970-0501
25	Pinion, Adjust	970-0502
26	Cover, L.H.	970-0551
27	Switch/Brkt Assy	699-0125

## RECOMMENDED SPECIAL TOOLS

.072" spline wrench (size DS), six-flute  
.096" spline wrench (size DS), six-flute

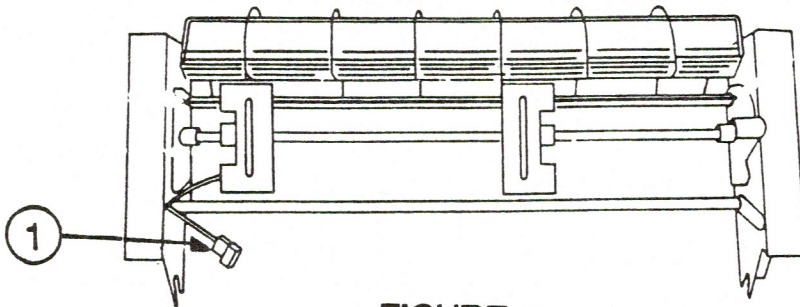


FIGURE 2

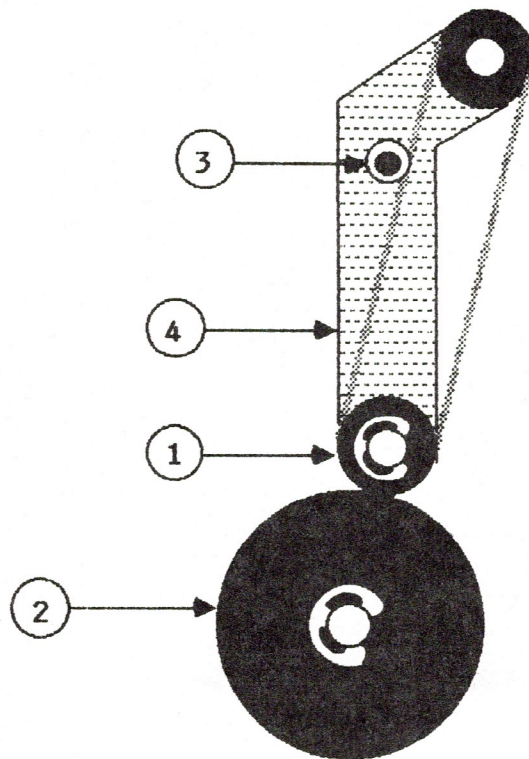


FIGURE 3



## NOTES ON SPECIFIC PROCEDURES

### A. Timing Belt Replacement/Adjustment

**Tools:** Medium flatblade screwdriver, 1/4 inch wrench,  
DWP spring gauge, ruler.

1. Carefully unplug the connector at the left of the Forms Tractor (Figure 2, #1) from the printer, and then lift the Forms Tractor from the DWP.
2. Move the right-hand tractor assembly next to the left hand assembly, so that it is out of the way for the next step. (There is a position-lock lever in the middle of each tractor assembly. To move the assembly, release the lever.)
3. Remove the two screws that hold the right-hand side cover and remove the cover.
4. Remove the E-ring and the black plastic washer from the lower drive-belt gear (Figure 3, #1)
5. Slip the timing belt off its gears.
6. Slip the new belt over the upper gear, then the lower.
7. Reinstall the black plastic washer and the E-ring on the lower gear.

#### Adjusting the Timing Belt:

A new timing belt should be adjusted so that there is neither binding nor backlash: that is, the gears that drive the belt (Figure 3, #1 and 2) should turn easily but without any appreciable free play between their teeth. This adjustment should also be performed if any Forms Tractor shows symptoms of binding or backlash such as uneven line feeding (poor vertical registration) or failure to advance paper.

1. Remove the right-hand cover, as in the procedure above.
2. Using a 1/4-inch wrench, loosen the nut on the sliding arm under the timing belt (Figure 3, #3).
3. Grasping the lower pulley, move the sliding arm (Figure 3, #4) until the belt feels taut. Tighten the nut. Then test the tension by lining up a ruler with one side of the belt and pushing on the belt with a spring gauge until the gauge registers 1/2 lb. The belt should be deflected 1/4", + or - 1/8". Readjust if necessary.

Then try out the tractor on the DWP to check for binding or backlash. If all is well, put the side cover back on.



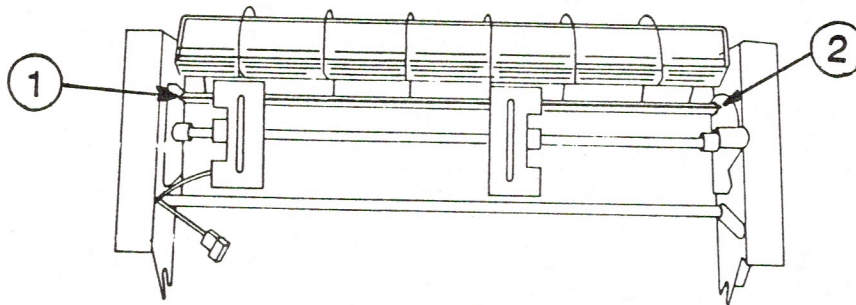


FIGURE 4

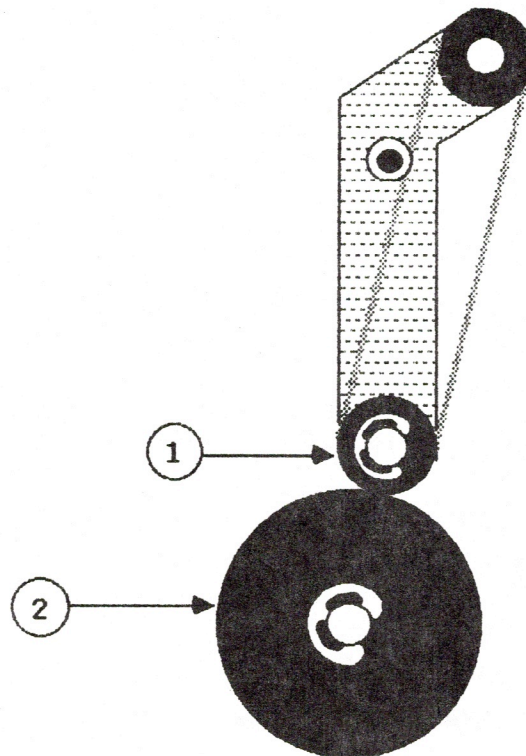


FIGURE 5

## **B. Tractor Assembly Replacement**

Apple recommends that you let Level 2 centers perform this replacement. To remove the tractors, you must first remove the pinion at the end of the round central shaft. The pinion is press-fitted on to the tapered end of the shaft; it requires a wheel puller for removal.

## **C. Paper-out Sensor Replacement/Adjustment**

Apple recommends that you let Level 2 centers replace the paper-out sensor. If the sensor should come loose, you can re-glue it to the Forms Tractor with Loctite #6 or equivalent fast-drying bonding agent. To position the sensor correctly for regluing, follow these steps.

1. With the DWP power on and the Forms Tractor installed, load 16-lb. paper into the Forms Tractor. If the sensor is too loose, the paper will not trip the sensor switch. As a result, the Attend Light on the front panel of the DWP will go on and the printer will stop printing.
2. Move the sensor against the paper until the Attend Light on the DWP goes off. (This indicates that the sensor switch "senses" the paper.) Mark this position on the left hand tractor assembly. Then apply glue and position the sensor.

## **CLEANING AND LUBRICATION**

If the plastic surfaces of the DWP-FT become soiled, use Formula 409 or any mild soap solution to clean them. Lubricate the Forms Tractor with Tellus oil (Apple P/N 970-0006). Every 18 months, put one drop of oil on each location pointed out in Figures 4 and 5 (see instructions below). In harsh environments and heavy usage applications, more frequent lubrication may be necessary.

1. Remove the forms tractor from the printer.
2. Put one drop of Tellus oil at each end of the square drive shaft (see Figure 4, #1 and #2).
3. Remove the right side cover of the forms tractor.
4. Remove the E-ring from the lower timing belt gear (Figure 5, #1). Remove the gear and put one drop of Tellus oil on the metal shaft.
5. Remove the E-ring from the idler gear (Figure 5, #2). Remove the gear and put one drop of oil on the shaft.
6. Replace both gears and E-rings.





# Apple Daisy Wheel Printer Technical Procedures

## Section 7

### Mechanical Cut Sheet Feeder

#### Contents:

Introduction.....	7.3
Troubleshooting Sheet Feeder Problems.....	7.5
Adjusting the Out-of-Paper Switch.....	7.9
Replacing the DWP Platen Cradle and Feed Rollers.....	7.11
Cleaning and Lubrication.....	7.12

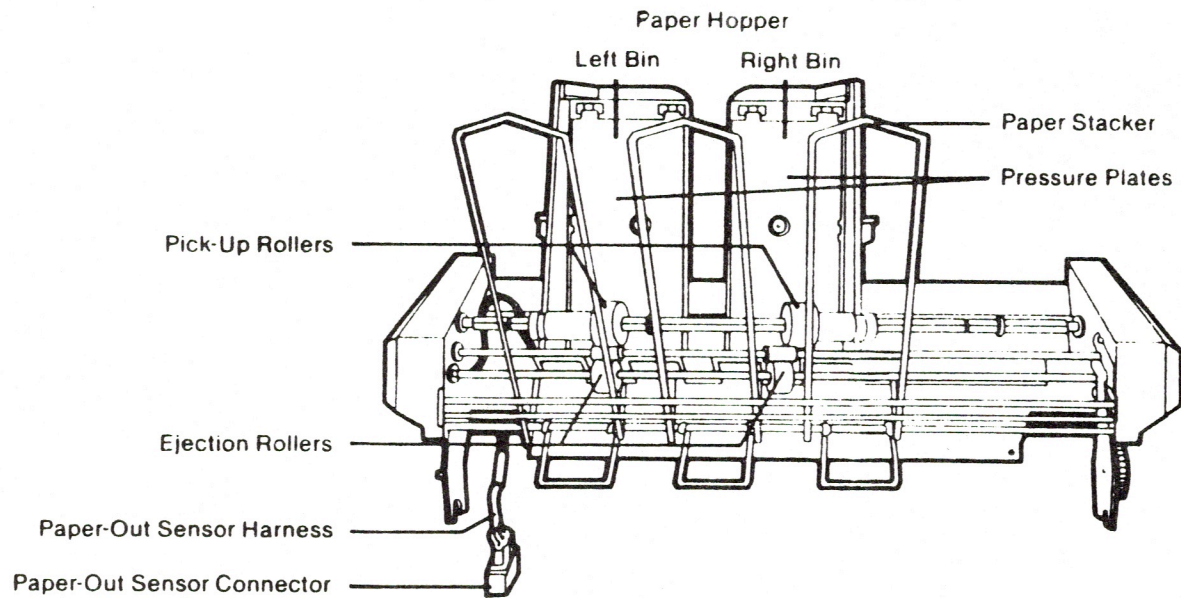


FIGURE 1

## INTRODUCTION

For installation and removal procedures, see the **Apple Mechanical Cut Sheet Feeder User's Manual**.

Early model DWPs may have the following problems using a Sheet Feeder:

1. ROM version 1.6 or earlier may cause Sheet Feeder malfunctions. (To determine what version is installed, run the DWP Terminal Self-Test.) Main PCB ROMs should be upgraded to Software Version 1.7 in order to use the Sheet Feeder; the ROMs are packaged with the Sheet Feeder.
2. On some early machines, the feed rollers and the platen cradle may be incompatible with Sheet Feeder operation and will cause folding and/or tearing of the top edge of the paper. In such a case, if adjustment of the Sheet Feeder's support feet does not remedy the situation, the cradle and feed rollers must be replaced; the procedure is on p. 7.11. The Troubleshooting section (p. 7.5) tells how to deal with these situations.
3. Very early DWPs may need to have Paper-Out Sensor Retrofit Kits (P/N 672-8011) installed, if they lack the connector for the Out-of-Paper switch cable. Instructions are packed with the Kit.



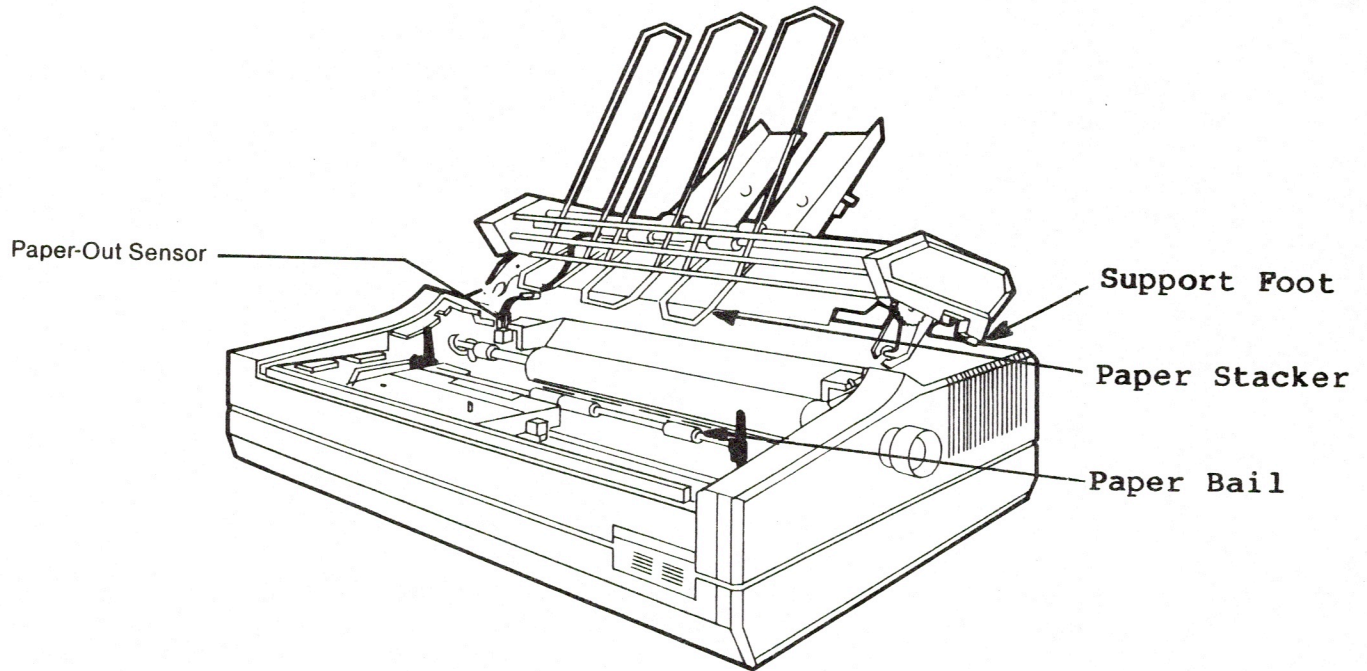


FIGURE 2

Checking the Platen Cradle

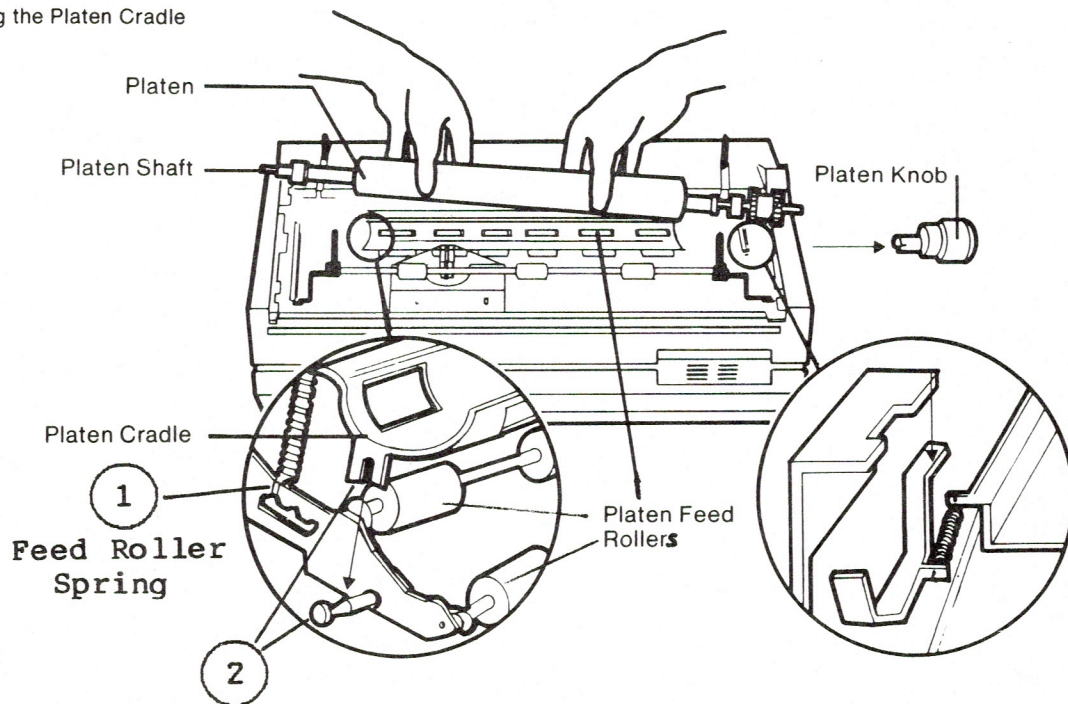


FIGURE 3

## TROUBLESHOOTING

### A. Top edge of paper folds, tears.

1. Adjust the Sheet Feeder's support feet to change the angle of feed. **CAUTION:** Make sure that the paper stacker does not interfere with the movement of the paper bail (see Figure 2).
2. Remove the DWP access cover, Sheet Feeder, DWP top cover and platen. Check the platen cradle and feed rollers (see Figure 3):
  - cradle seated correctly? The notched ends of the cradle should sit squarely on the pins at the end of the feed roller assemblies. (See Figure 3, #2.)
  - feed rollers jammed? Remove jam.
  - feed rollers bent, damaged? Replace rollers.
  - If cradle is seated correctly and rollers are not jammed or damaged, but paper still tears or folds, **and if this is a DWP purchased before October 1983**, then replacing the cradle and the front and rear feed rollers at the locations where the folding or tearing occurs **may** solve the problem. (See p. 7.11 for replacement procedure. Before deciding which sets of rollers to replace, check both sets of rollers by feeding 11 inch paper sideways, to see if rollers on the right side also cause folding/tearing.)

### B. Paper skews to one side and/or develops wrinkles when exiting from platen

1. Make sure paper stacker is correctly seated and thumb screws are tight (see Sheet Feeder User's Manual, p. 4).
2. Make sure platen and cradle are correctly seated.

CONTINUED ON NEXT PAGE



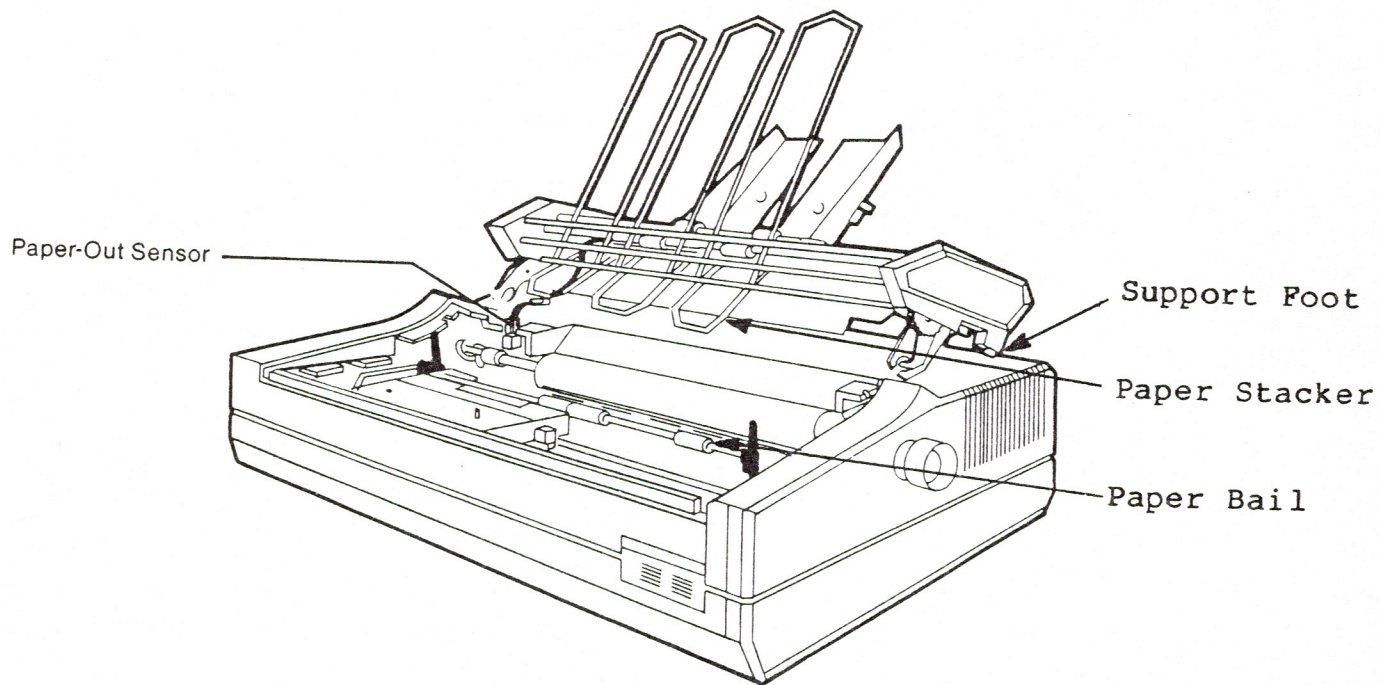


FIGURE 2

Checking the Platen Cradle

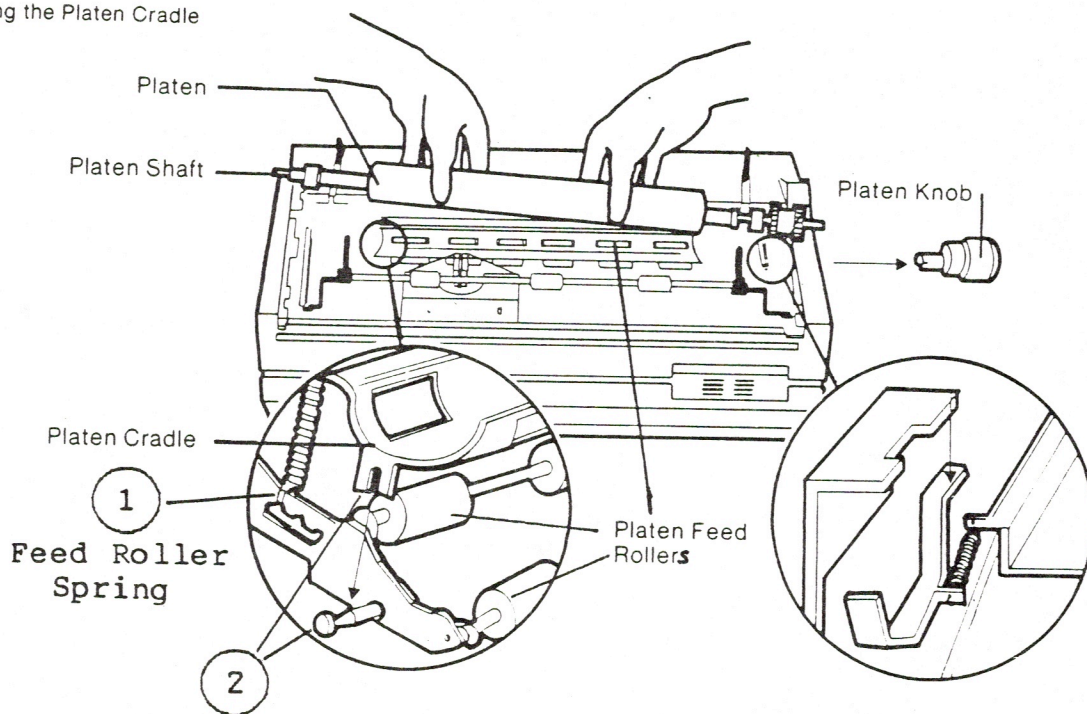


FIGURE 3



### **C. Paper does not feed**

1. Is Out-of-Paper switch connected? If not, connect it.
2. Run DWP Terminal Self-Test (see BASICS) to check Software Version. If Software Version is 1.6 or earlier, replace main PCB ROMs with version 1.7 ROMs.
3. Make sure Paper Release lever is pushed back all the way (feed rollers engaged).
4. Make sure paper is correctly prepared for loading (fan through both ends of the paper stack; make sure paper curls toward you; remove any damaged sheets).
5. Check that the Sheet Feeder is properly installed.
6. Check that the platen cradle is seated correctly. The notched ends of the cradle should sit squarely on the pins at the end of the feed roller assemblies. (See Figure 3, #2.)
7. Check that the four feed roller springs beneath the platen are adjusted to the middle position. **NOTE:** Figure 3, #1 shows the spring adjusted to the rear position: to move the spring to the middle position, use needlenose pliers, a screwdriver blade, a good deal of force, and care.

### **D. False out-of-paper indication (paper is present, but Ready lamp blinks, Attend lamp comes on)**

1. Remove Sheet Feeder and see if DWP functions correctly. If not, see DWP Troubleshooting section.
2. Adjust Out-of-Paper switch (see p. 7.9).

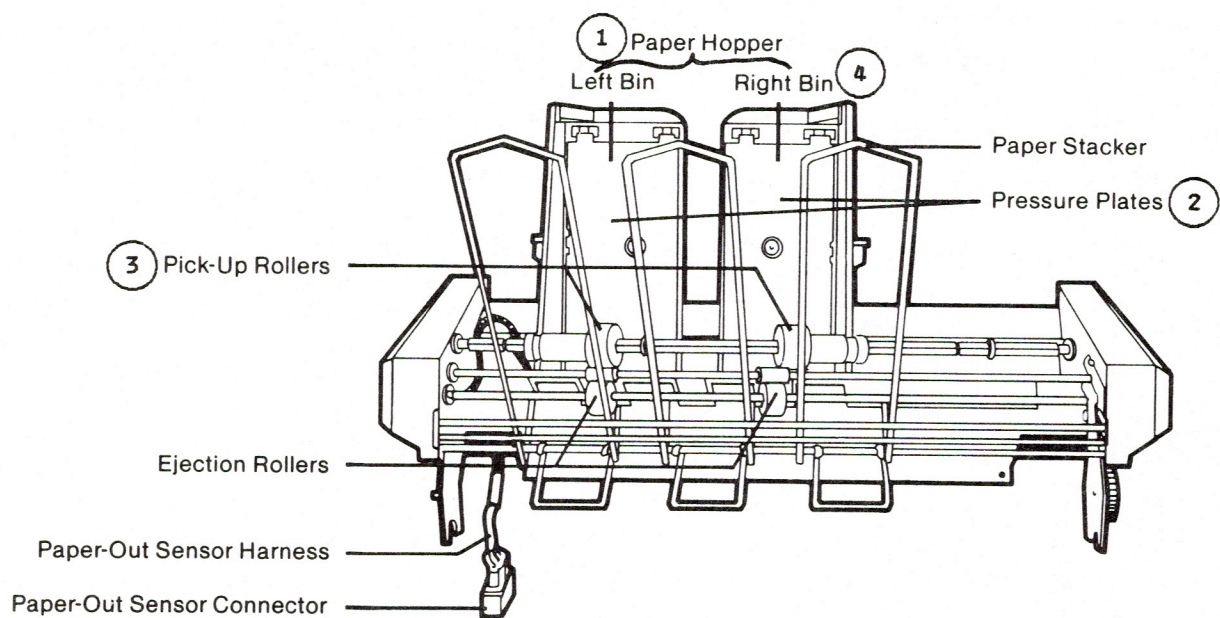


FIGURE 4



## **ADJUSTING THE OUT-OF-PAPER SWITCH**

The Out-of-Paper (OOP) switch should cause the DWP to stop printing when the Sheet Feeder hopper is empty or when the paper is jammed. If the OOP switch does not function correctly, try to adjust it before replacing it or swapping out the Sheet Feeder. Use the following procedure.

### **Check the Switch:**

1. With power off the DWP, remove paper from the Sheet Feeder hopper (Figure 4, #1).
2. Push the pressure plates (Figure 4, #2) back until they lock.
3. Feed a piece of 14 or 16 lb. paper between the hopper and the pick-up rollers, as if you were going to feed it to the printer by hand. Just before it reaches the platen, the paper passes the OOP switch, and at that point you should hear a "click". Try this several times, pushing the paper down and then pulling it back up. IF YOU DO **NOT** HEAR THE SWITCH CLICK, continue with this procedure. If you hear a click but the switch still does not work, misadjustment is not the problem - see the Troubleshooting section (p. 7.7) for further information.

### **If the switch does not click when paper is installed:**

1. With the Sheet Feeder removed from the DWP, follow the OOP cable until you locate the OOP switch at the back of the Sheet Feeder.
2. Push the right paper bin (Figure 4, #4) as far right as possible, to give yourself room for the next steps.
3. Loosen but do not remove the two OOP switch screws, using a small screwdriver.
4. Move the OOP switch as you insert and remove a sheet of light paper (14-16 lb.). When inserting/removing the paper causes the switch to click, tighten the screws.
5. Install the Sheet Feeder on the DWP, load a small stack of paper, and test whether printing occurs normally when paper is present and stops (and the Attend lamp comes on) when the paper hopper is empty. If so, you have corrected the problem. If not, replace the switch or the entire Sheet Feeder.



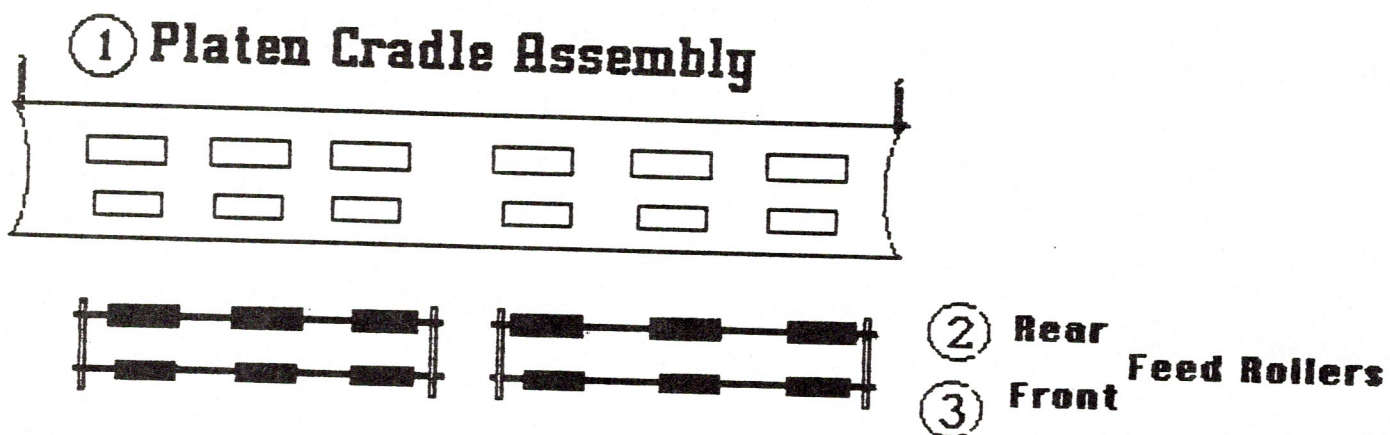


FIGURE 5

## REPLACING THE DWP PLATEN CRADLE AND FEED ROLLERS

Parts you may need (depending on the situation):

Cradle assembly: P/N 970-0608 (does not include springs)  
(Figure 5, #1)

Rear feed roller shaft: P/N 970-0015 (Figure 5, #2)

Front feed roller shaft: P/N 970-0014 (Figure 5, #3)

1. Disconnect the AC power cord from the DWP.
2. Remove the top cover and the platen.
3. Lift the cradle gently forward and up off its pins, and rest it upside down on the metal rods behind it.
4. To replace either set of feed rollers:
  - a) Grasp the front roller shaft and push gently against one side-plate until the roller shaft comes free.
  - b) Grasp the rear roller shaft and move one side-plate forward while pushing out on it, until the roller comes free.
  - c) Install the new **rear** (larger) roller shaft first, then the new **front** (smaller) roller shaft.
5. To replace the cradle:
  - a) Start with the cradle in normal position, seated on the feed rollers.
  - b) Use your fingers or a bent paper clip or equivalent to remove the small springs from the sides of the cradle. (Leave the other side of the springs attached to the DWP.)
  - c) Remove the old cradle and put the new one in place. Attach the springs.

## CLEANING AND LUBRICATION

1. If the plastic surfaces of the Sheet Feeder become soiled, use Formula 409 or any mild soap solution to clean them.
2. Every 2000 sheets of paper, the rubber rollers should be cleaned with Fedron (**sparingly**).
3. Every 18 months, put one drop of Tellus oil (Apple P/N 970-0006) on each of the following five locations:
  - Both ends of the square shaft (Figure 6, #1)
  - Both ends of the front round shaft (Figure 6, #2)
  - The inner gear of the square shaft (Figure 6, #3). To reach the inner gear of the square shaft, remove the two black Phillips screws from the right side plate and remove the plastic side cover. Then put one drop of Tellus oil on the bearing at the end of the square shaft.

**NOTE:** In harsh environments and heavy usage applications, more frequent lubrication may be necessary.

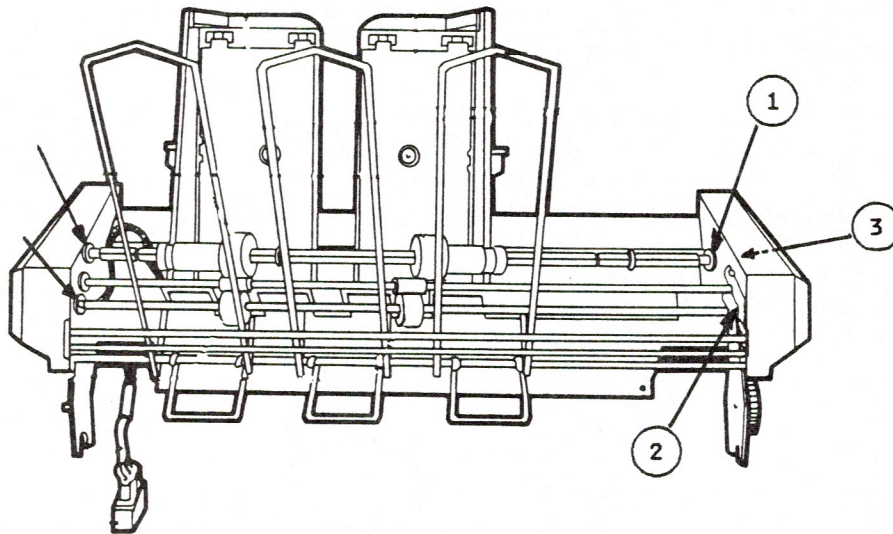


FIGURE 6



# Apple Daisy Wheel Printer Technical Procedures

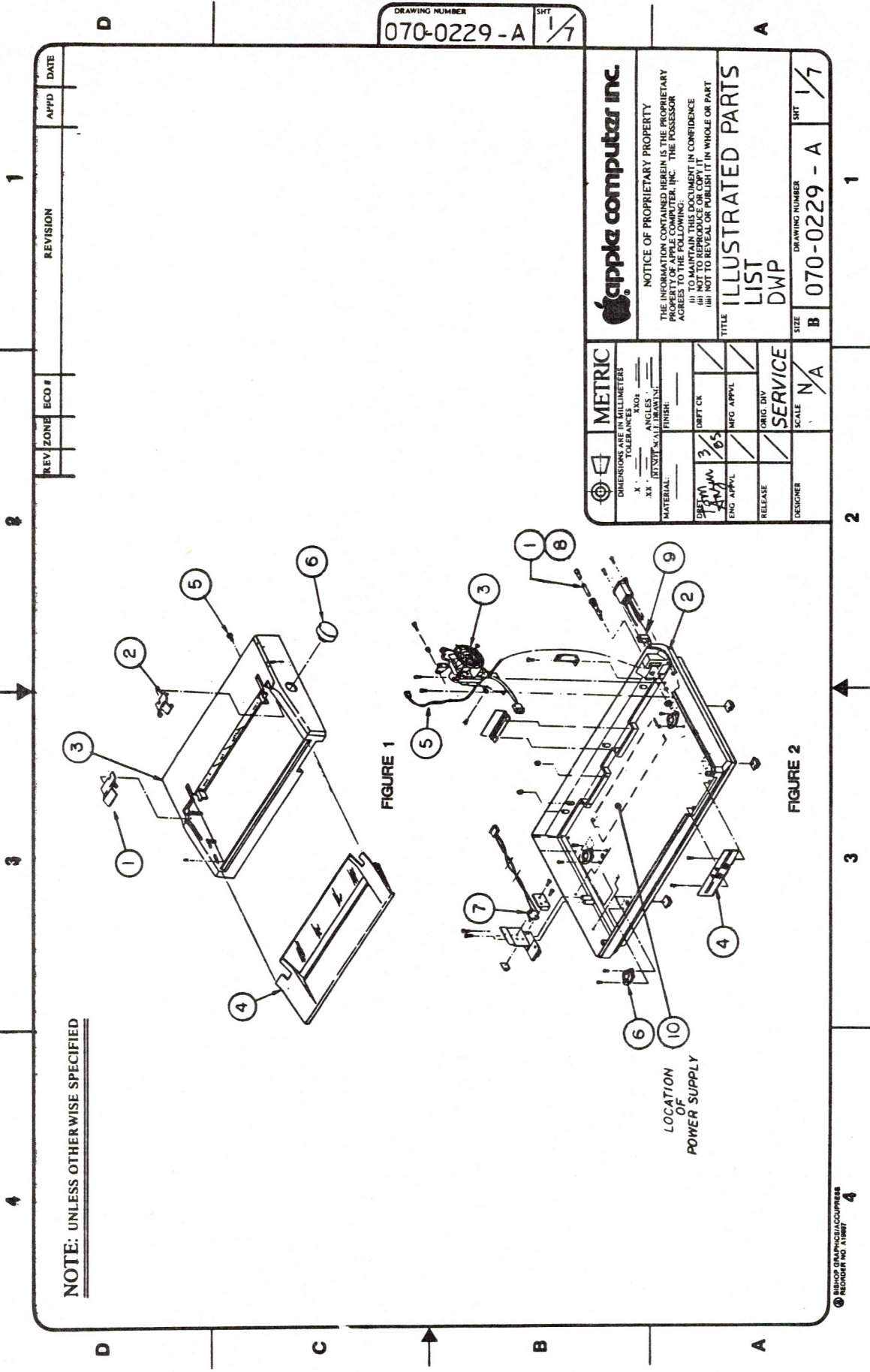
## Section 8

### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Daisy Wheel Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

Top Cover Assembly.....	8.1
Bottom Cover Assembly.....	8.1
Printer Layout.....	8.3
Printwheel Motor Assembly.....	8.5
Carriage Drive Mechanism.....	8.7
Paper Feed Mechanism.....	8.9
Carriage Assembly.....	8.11
Platen Assembly.....	8.13



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MATERIAL:		ORIGIN: DIV	
DESIGNED BY:		RELEASE:	
ENG APPVL:		DESIGNER:	

**DAISY WHEEL PRINTER, TOP COVER ASSEMBLY (Figure 1)**

Item	Part No.	Description
1	970-0044	Door, Tractor Cover Left
2	970-0045	Door, Tractor Cover Right
3	970-0043	Cover, Top
4	699-0106	Panel Assembly, Access
5	970-0624	Screw, Plastic (covers)
6	970-0002	Knob, Platen

**DAISY WHEEL PRINTER, BOTTOM COVER ASSEMBLY (Figure 2)**

1	740-0103	Fuse, 5 Amp 3AG (110V)
2	970-0042	Cover, Bottom
3	970-0038	Fan Assembly, Mini-Intake
4	970-0580	P. C. B., Front Panel Indicator
5	699-0102	Resistor Assembly, Hammer
6	970-0036	Shock Mount
7	970-0037	Switch, Cover Interlock
8	740-0102	Fuse, 3 Amp 3AG (220V), (for European DWP)
9	970-0010	Switch, AC Line
10	661-75088	DWP Power Supply, 115V



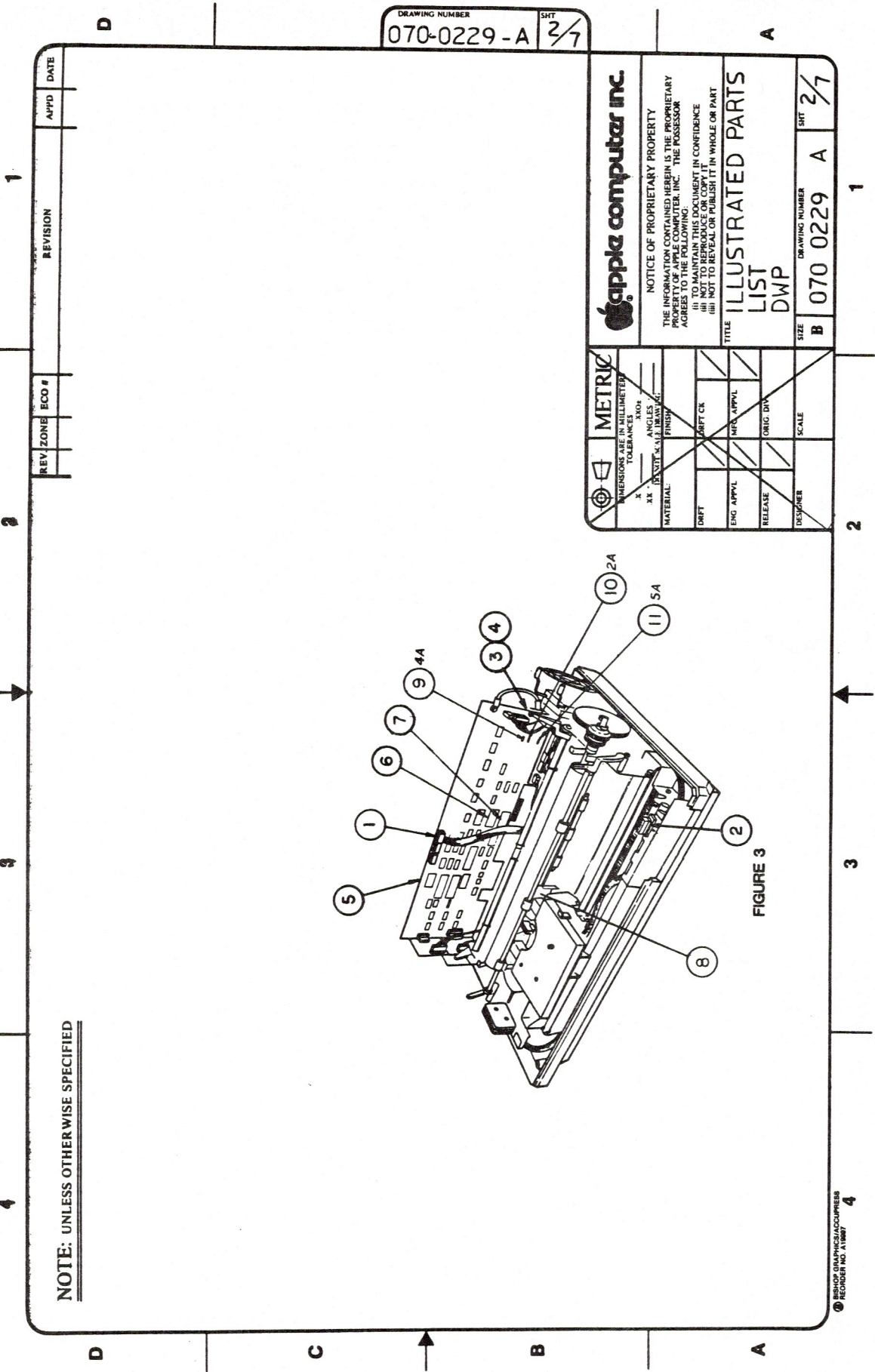


FIGURE 3

NOTE: UNLESS OTHERWISE SPECIFIED

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# DAISY WHEEL PRINTER, PRINTER LAYOUT (Figure 3)

Item	Part No.	Description
1	970-0581	Cable Assembly, Front Panel
2	970-0582	DIP Switch, Rocker Type
3	970-0618	Fastener, Grommet (PCB)
4	970-0619	Fastener, Plunger (PCB)
5	661-75087	PCB, Main Logic Card
6	341-0173	IC, 2764 8K x 8 EPROM (1.7), U43
7	341-0174	IC, 2764 8K x 8 EPROM (1.7), U44
8	699-0103	Shield Assembly Ribbon
9	740-0031	Fuse, Pico 4 Amp (F1)
10	740-0030	Fuse, Pico 2 Amp (F2)
11	740-0032	Fuse, Pico 5 Amp (F3)

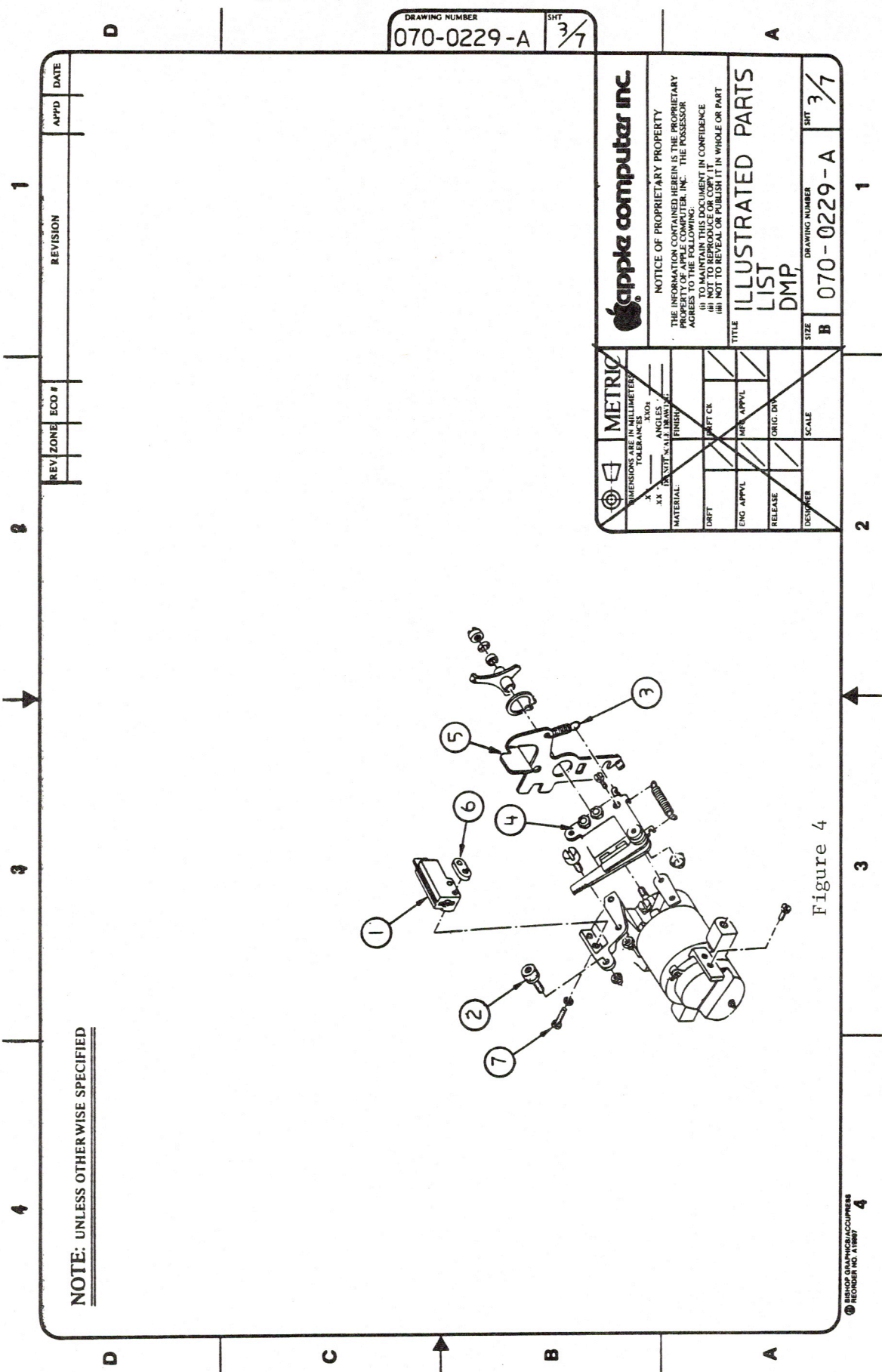


Figure 4

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DRAFT		DRAFT CK	
MATERIAL		FINISH	
DIM. UNIT		W.A.P. DRAWING	
X1		X2	
X3		X4	
X5		X6	
X7		X8	
X9		X10	
X11		X12	
X13		X14	
X15		X16	
X17		X18	
X19		X20	
X21		X22	
X23		X24	
X25		X26	
X27		X28	
X29		X30	
X31		X32	
X33		X34	
X35		X36	
X37		X38	
X39		X40	
X41		X42	
X43		X44	
X45		X46	
X47		X48	
X49		X50	
X51		X52	
X53		X54	
X55		X56	
X57		X58	
X59		X60	
X61		X62	
X63		X64	
X65		X66	
X67		X68	
X69		X70	
X71		X72	
X73		X74	
X75		X76	
X77		X78	
X79		X80	
X81		X82	
X83		X84	
X85		X86	
X87		X88	
X89		X90	
X91		X92	
X93		X94	
X95		X96	
X97		X98	
X99		X100	



DAISY WHEEL PRINTER, PRINTWHEEL MOTOR ASSEMBLY (Figure 4)

Item	Part No.	Description
1	970-0003	Hammer Assembly complete
2	970-0013	Bumper, Hammer Armature
3	970-0018	Spring, Extension (Printwheel Motor Latch)
4	699-0099	Armature, Hammer Assembly
5	970-0022	Latch, Printwheel Motor
6	970-0613	Nut Plate, Hammer
7	970-0623	Screw 3-48 X .625

SIZE	DRAWING NUMBER	SHT
B	070-0229 - A	4/7

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REORDER NO. A10867 4

DAISY WHEEL PRINTER, CARRIAGE DRIVE MECHANISM (Figure 5)

Item	Part No.	Description
1	661-75090	Motor, Carriage Drive complete
2	970-0040	Lever, Paper Bail Left
3	970-0041	Lever, Paper Bail Right
4	970-0622	Spring, Extension (paper bail)
5	970-0031	Shaft, Paper Bail
6	970-0019	Roller, Paper Bail (rubber)
7	970-0030	Bearing, Spherical
8	970-0005	Pulley, Idler Assembly
9	970-0029	Washer, Thrust
10	970-0028	Shaft, Pulley Assembly
11	970-0027	Bracket, Pulley Adjust
12	970-0085	Nut, #8 Hex Lock
13	970-0607	Grip Ring
14	970-0621	Capacitor, Carriage Motor



NOTE: UNLESS OTHERWISE SPECIFIED

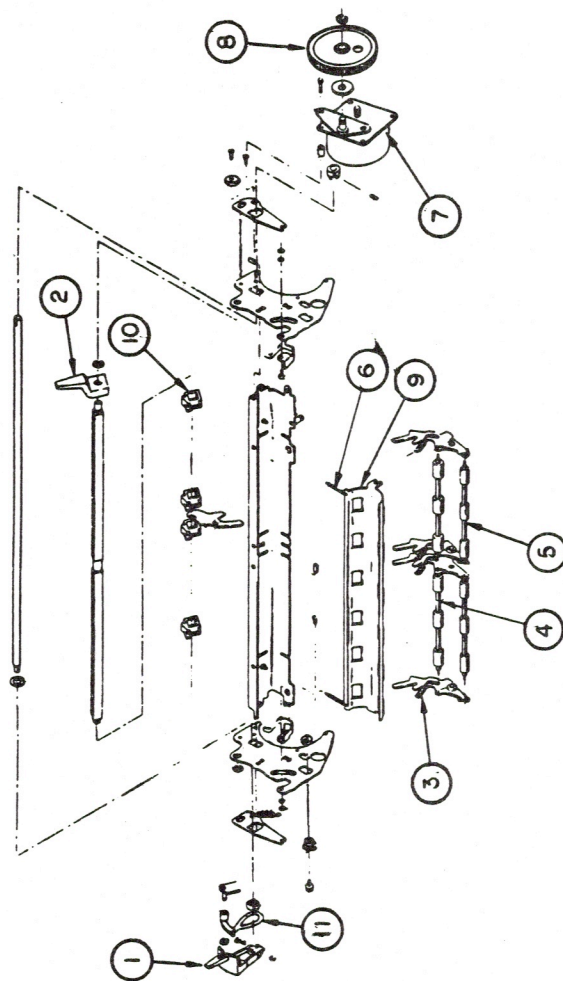


FIGURE 8

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DRAWING NUMBER 070-0229 - A SHT 5/7

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TITLE ILLUSTRATED PARTS LIST DWP		DRAWING NUMBER 070-0229 - A SHT 5/7	
METRIC DIMENSIONS ARE IN MILLIMETERS ANGLES IN DEGREES FINISHES MATERIAL DRIFT END APPL RELEASE DESIGNER		SIZE B SCALE	

DAISY WHEEL PRINTER, PAPER FEED MECHANISM (Figure 6)

Item	Part No.	Description
1	970-0026	Lever Arm, Impression Control
2	970-0025	Lever Arm, Feed Roller Release
3	970-0023	Spring, Extension (feed roller)
4	970-0015	Shaft, Rear Feed Roller
5	970-0014	Shaft, Front Feed Roller
6	970-0020	Spring, Extension (cradle)
7	699-0104	Stepper Motor, Paper Feed
8	970-0017	Gear, Platen Idler*
9	970-0608	Cradle Assembly
10	970-0610	Cam Feed Roller
11	970-0606	Spring, Extension (Impression Control Lever)

\* - Same as "Gear, Idler Paper Feed"

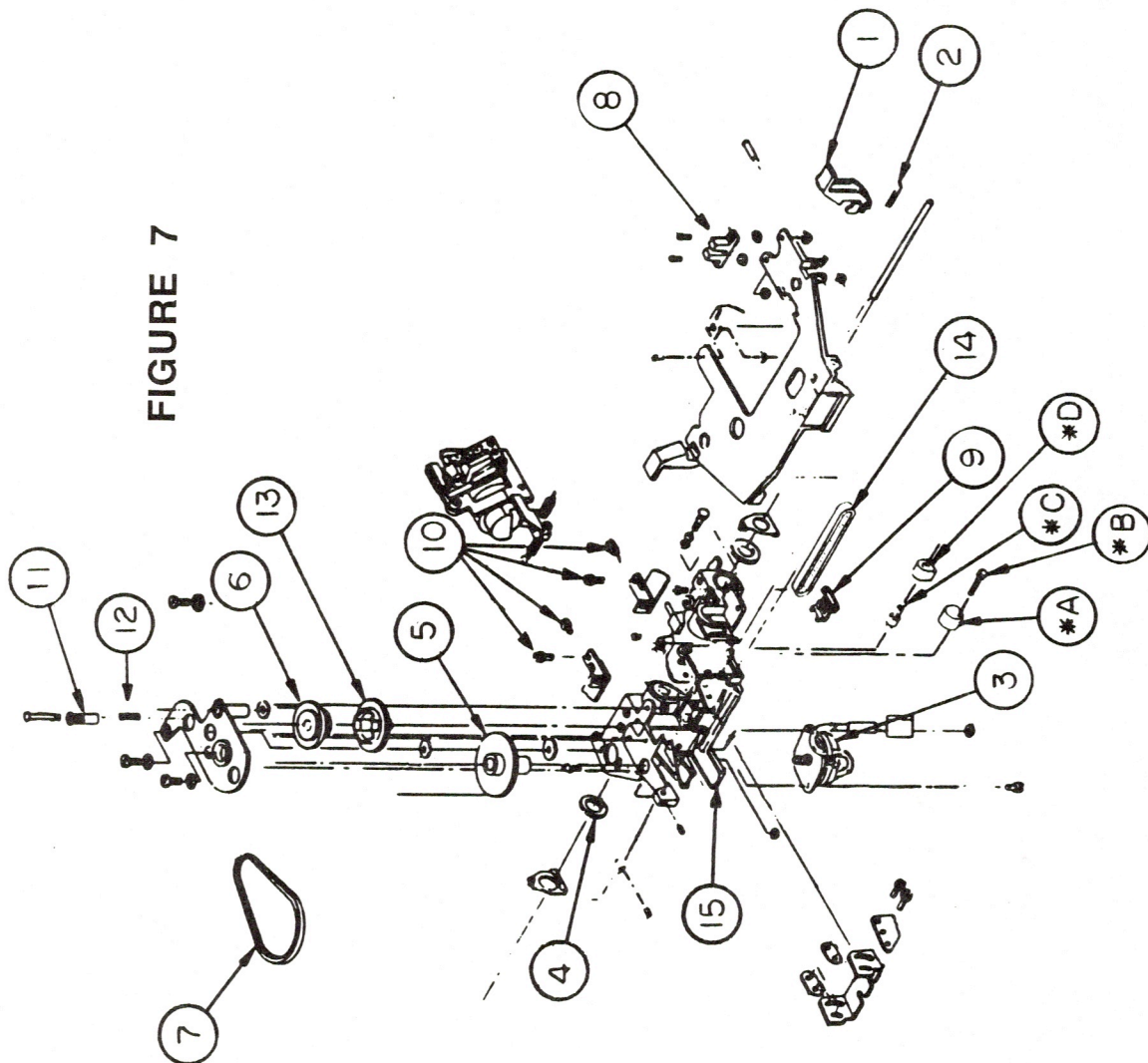


FIGURE 7



# DAISY WHEEL PRINTER, CARRIAGE ASSEMBLY (Figure 7)

Item	Part No.	Description
	661-75089	Carriage Assembly, Complete
1	970-0032	Latch, Ribbon Box
2	970-0024	Spring, Extension (ribbon latch)
3	970-0034	Stepper Motor, Ribbon Feed
4	970-0004	Felt Wiper, Carriage
5	970-0033	Pulley Assembly, Ribbon Rewind
6	970-0076	Drive Gear, Ribbon Clutch
7	970-0079	Drive Belt, Ribbon Rewind
8	970-0021	Photon Module (End of Ribbon)
9	970-0612	Cleat, Belt
10	970-0614	Screw 4-40 X 5/16 SEMS
11	970-0615	Drive Key, Ribbon Drive
12	970-0616	Spring, Compression (Ribbon Drive Key)
13	970-0617	Pulley, Timing (Ribbon)
14	970-0001	Carriage Drive Belt
15	970-0722	Yoke, Bearing

*A	Eccentric lobe
*B	Eccentric screw
*C	Eccentric washer
*D	Plate, Ribbon Plate Lock

\* These parts are now obsolete. If one of them requires replacement, replace all four with the following new parts:

*A	970-0626	Bracket, Ribbon Plate Adjust (lea.); replaces eccentric lobe
*B	970-0625	Screw 6-32 X .562 (2ea.); replaces eccentric screw
*C	970-0628	Washer #6 (2ea.); replaces eccentric washer
*D	970-0627	Plate, Ribbon Plate Lock (lea.); replaces eccentric lobe

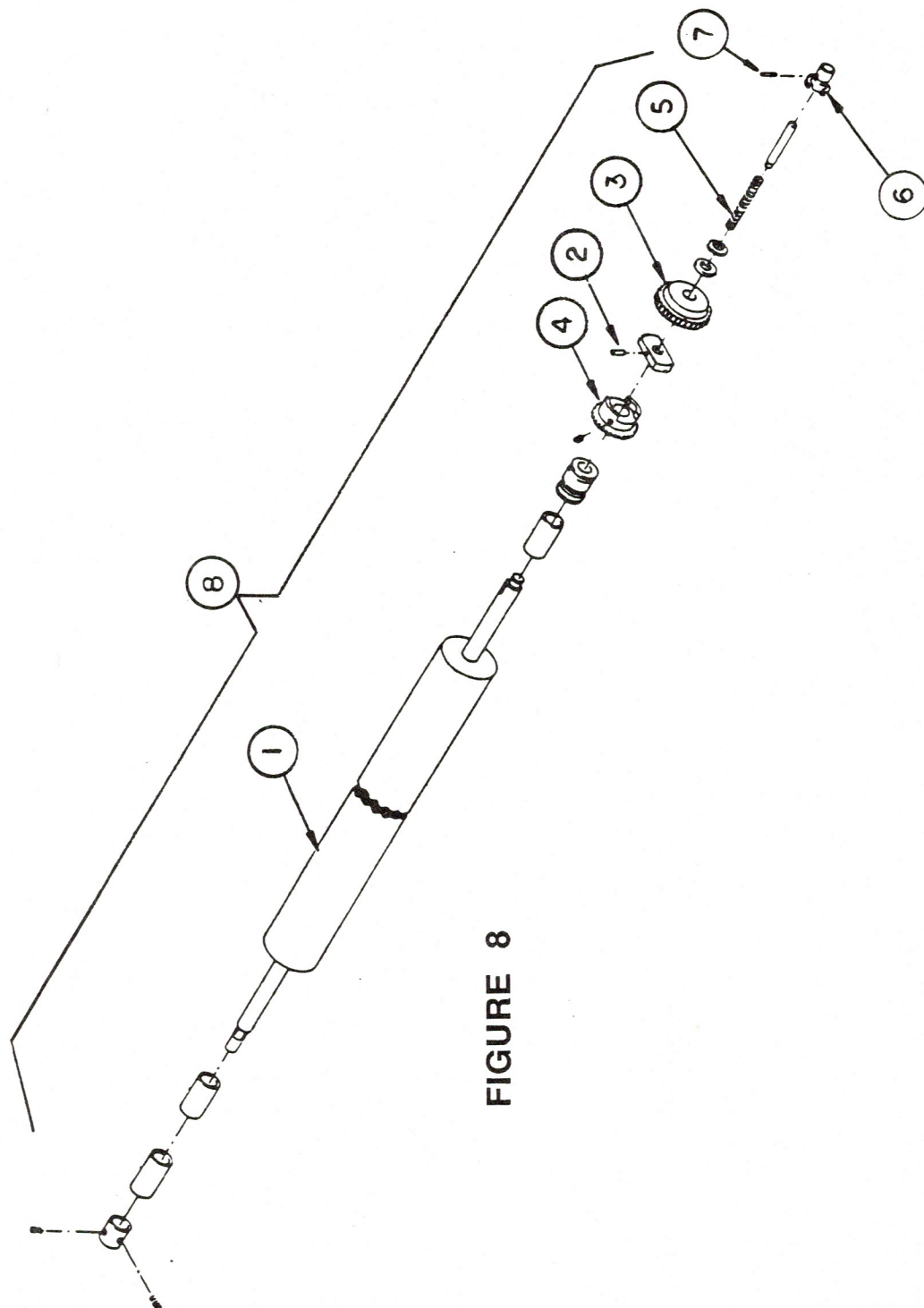


FIGURE 8

DAISY WHEEL PRINTER, PLATEN ASSEMBLY (Figure 8)

Item	Part No.	Description
	699-0101	Platen Assembly complete
1	699-0098	Core, Platen
2	970-0035	Needle Roll
3	970-0016	Gear, Platen
4	970-0602	Gear, Tractor Drive
5	970-0603	Spring, Compression, Platen Clutch
6	970-0604	Adapter, Platen Knob
7	970-0979	Roll Pin
8	699-0101	Daisy Wheel Platen Assy





# Apple Daisy Wheel Printer Technical Procedures

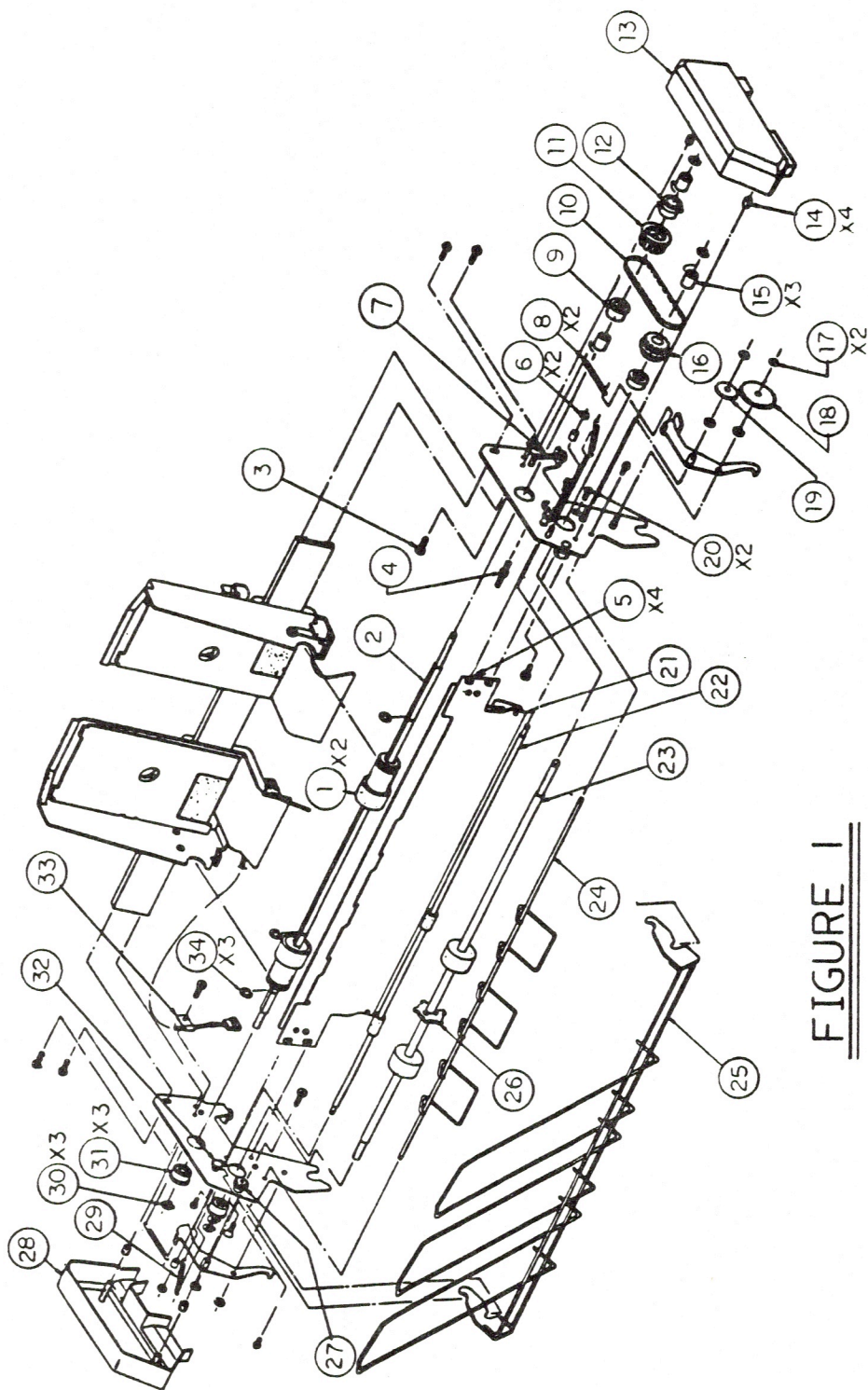
## Section 9

### Sheet Feeder Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Sheet Feeder, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

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Hopper Assembly, Right Hand.....	9.7



**FIGURE 1**  
**SHEET FEEDER**



# **SHEET FEEDER (Figure 1)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	970-0693	Pick-up Roller Assembly
2	970-0691	Square Shaft Assembly
3	970-0666	Stud, #8-32 Self-clinch
4	970-0702	Stud, Pinch Roller
5	970-0705	Nut, Modified
6	970-0659	E-Ring, Retainer
7	970-0503	Stud, Adjusting (foot)
8	970-0654	Spring
9	970-0690	Clutch Housing
10	970-0668	Belt, Timing
11	970-0688	Pulley
12	970-0689	Cam
13	970-0680	Cover, R.H. (Beige)
14	970-0669	Fastener, #8-18
15	970-0665	Clutch Assembly, Roller
16	970-0687	Cluster, Gear/Pulley
17	970-0660	E-Ring, Retainer
18	970-0685	Gear, Platen
19	970-0686	Gear, Idler
20	970-0672	Screw, #6-32 x 5/15 Flat Head
21	970-0703	Paper Guide Assembly
22	970-0697	Pinch Roller Assembly
23	970-0692	Ejection Roller Assembly
24	970-0698	Wire Guide
25	970-0699	Stacker
26	970-0695	Roller, Gear
27	970-0682	Thumb Knob
28	970-0681	Cover, L.H. (Beige)
29	970-0655	Spring
30	970-0662	Grip Ring, Retainer
31	970-0663	Ball Bearing
32	970-0683	Stand-off
33	970-0667	Cable Clamp, Steel
34	970-0661	E-Ring, Retainer

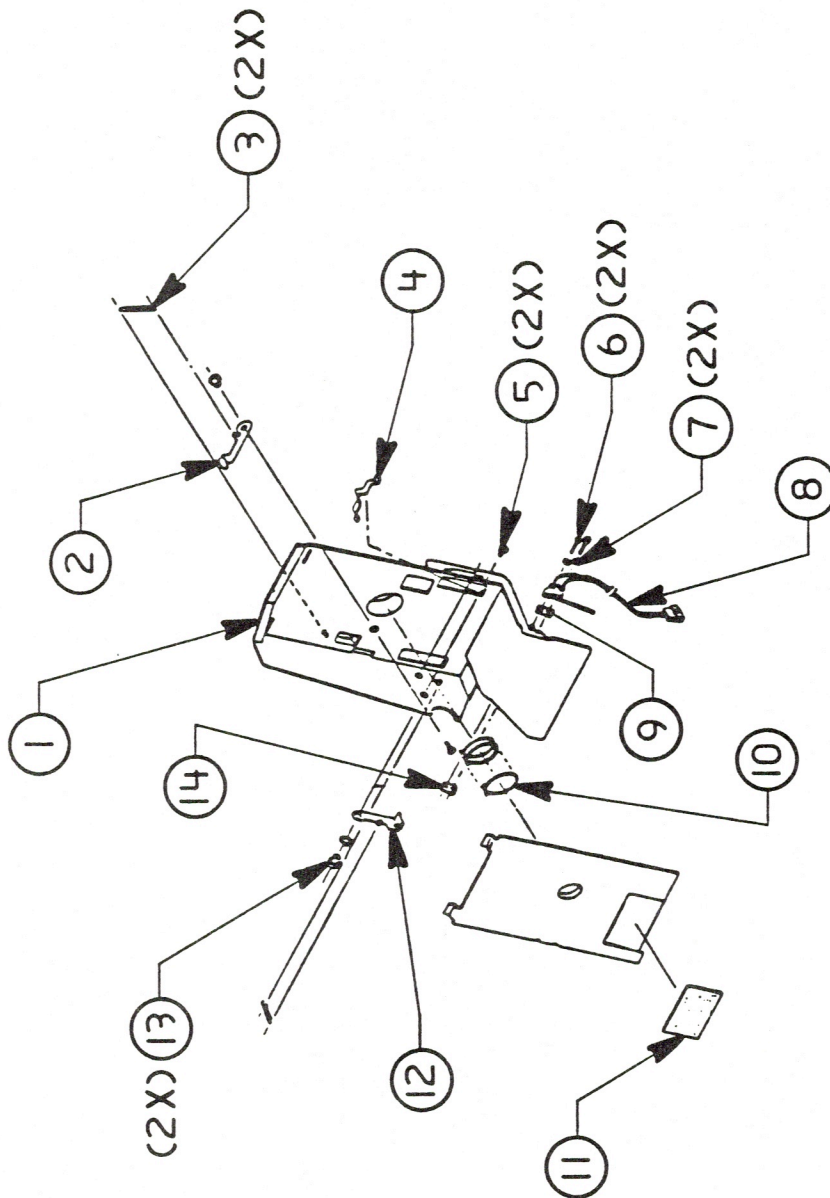


FIGURE 2  
HOPPER ASSEMBLY  
LEFT HAND

**SHEET FEEDER - HOPPER ASSEMBLY, LEFT HAND (Figure 2)**

Item	Part No.	Description
1	970-0674	Hopper, L.H.
2	970-0676	Pressure Plate Latch, L.H.
3	970-0656	Spring, Extension
4	970-0706	Spring, Hopper
5	970-0670	Screw, #4-40 x .187
6	970-0664	Lockwasher, Int. Tooth
7	970-0657	Screw, #2-56 x .437
8	970-0684	OOP/Jam Switch Assembly
9	970-0671	Insulator, OOP Switch
10	970-0694	Spring, Compression
11	970-0679	Cork
12	970-0678	Corner Separator, L.H.
13	970-0696	Stand-off
14	970-0704	Nut Plate



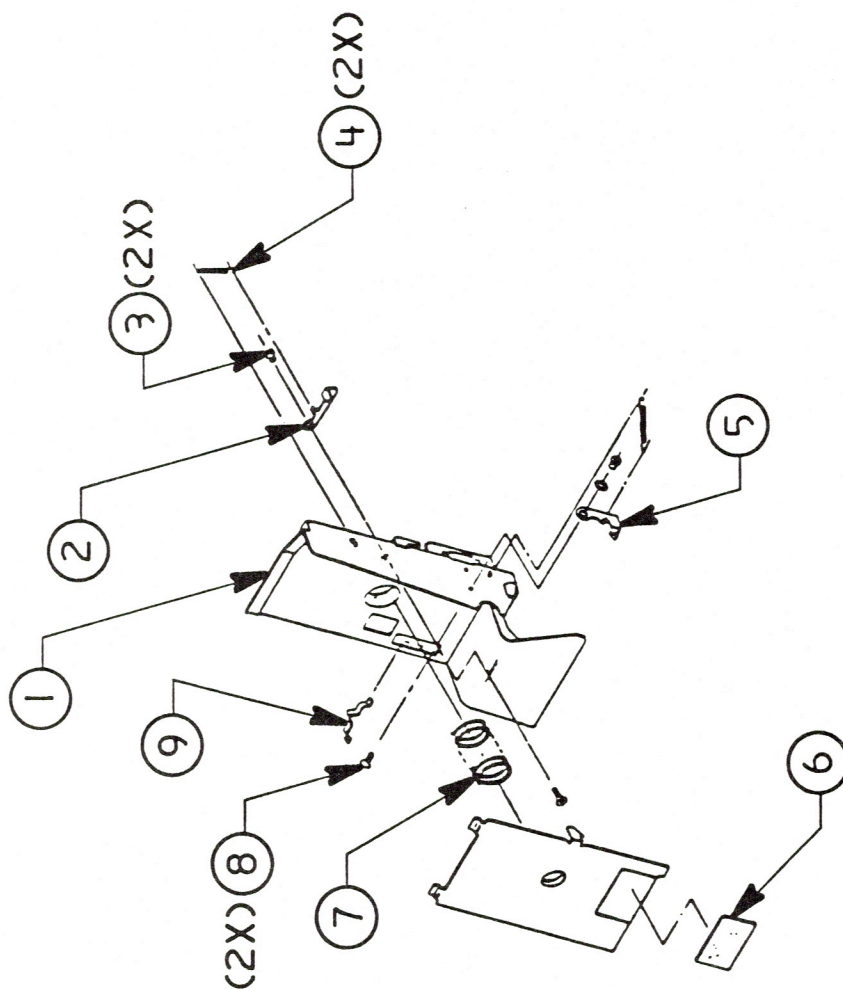


FIGURE 3  
HOPPER ASSEMBLY  
RIGHT HAND

**SHEET FEEDER - HOPPER ASSEMBLY, RIGHT HAND (Figure 3)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	970-0673	Hopper, R.H.
2	970-0675	Pressure Plate Latch, R.H.
3	970-0696	Stand-off
4	970-0656	Spring, Extension
5	970-0677	Corner Separator, R.H.
6	970-0679	Cork
7	970-0694	Spring, Compression
8	970-0670	Screw, #4-40 x .187
9	970-0706	Spring, Hopper





Apple Daisy Wheel Printer  
Technical Procedures

Section 10

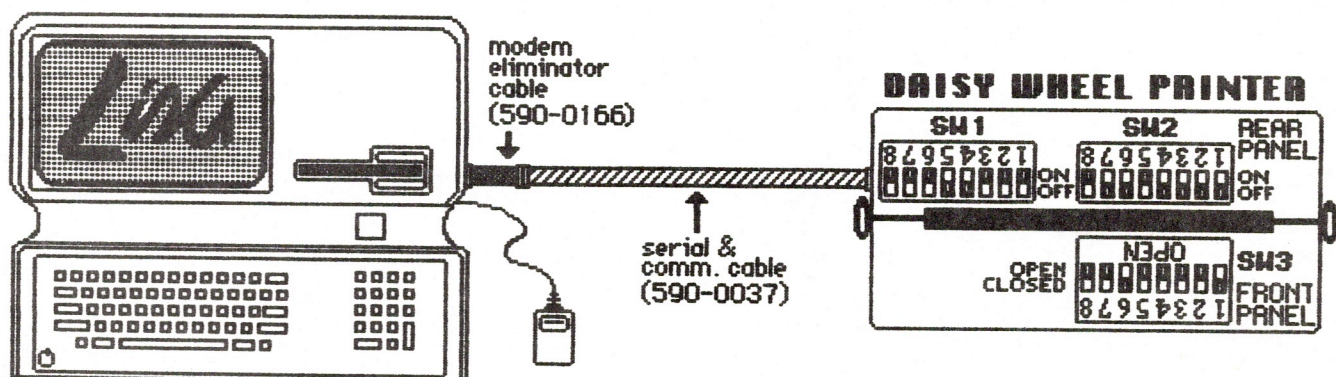
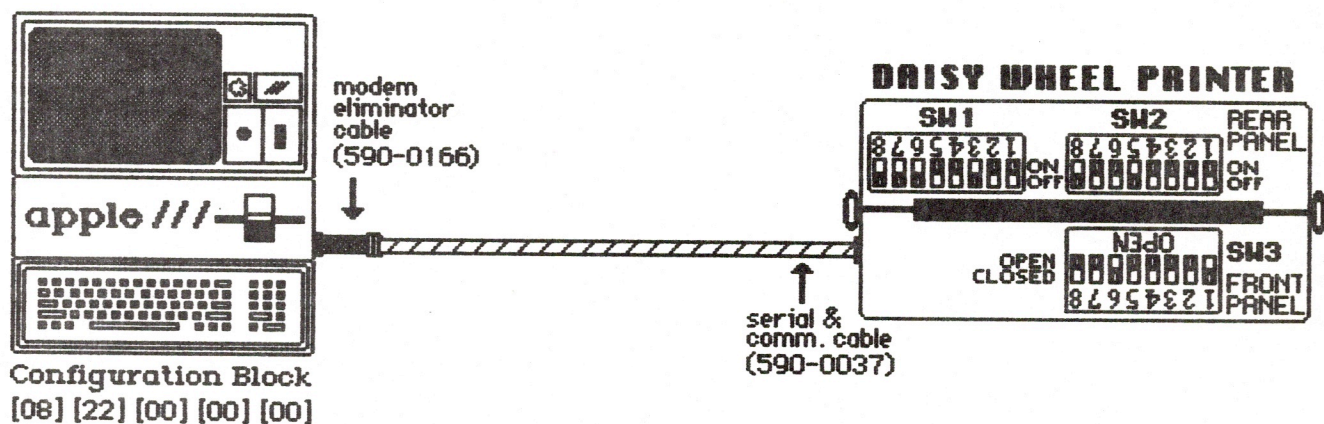
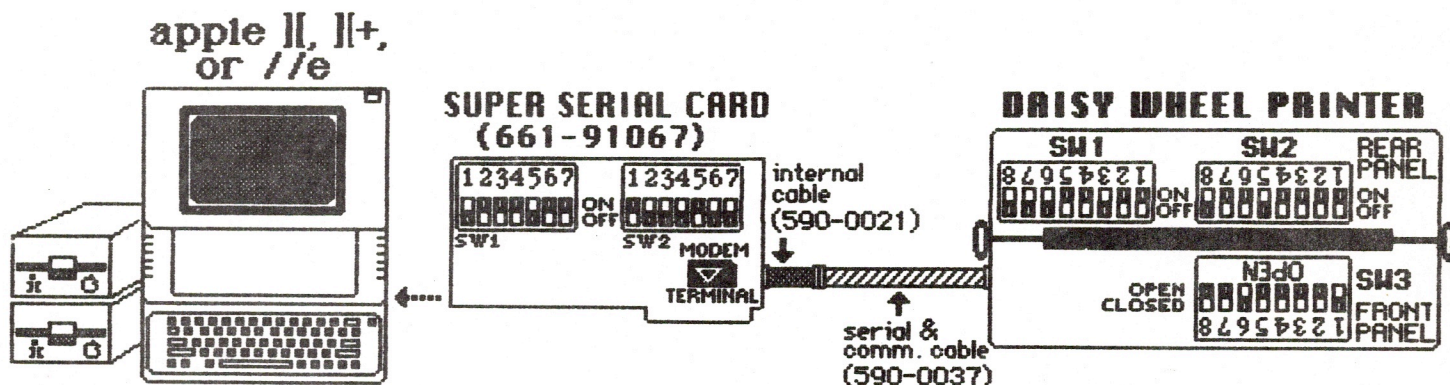
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--	------



# Daisy Wheel Printer Configuration





End of Daisy Wheel  
Printer Section Start of  
Scribe Printer Section

# APPLE SCRIBE PRINTER TECHNICAL PROCEDURES

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# Scribe Printer Technical Procedures

## Section 1

### Basics

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## WHAT'S IN THIS SECTION

This section, Basics, gives you information about paper requirements, DIP switch settings, self-tests, and connector functions that can help you in troubleshooting and general use of the Apple® Scribe® Printer.

## CONFIGURATION REQUIREMENTS

The Scribe printer uses the same interface cable as the Apple ImageWriter Printer.

In general, software drivers and filters for the ImageWriter will work for the Scribe, but certain features (such as boldface) will not be supported. Some software programs, such as AppleWorks™, require a customized driver program for the Scribe printer. (For more information, refer to the "Printers and Printing" chapter in the AppleWorks manual.) Customized print drivers for the Scribe will also offer optimized ribbon use in certain applications.

## DIP SWITCH SETTINGS

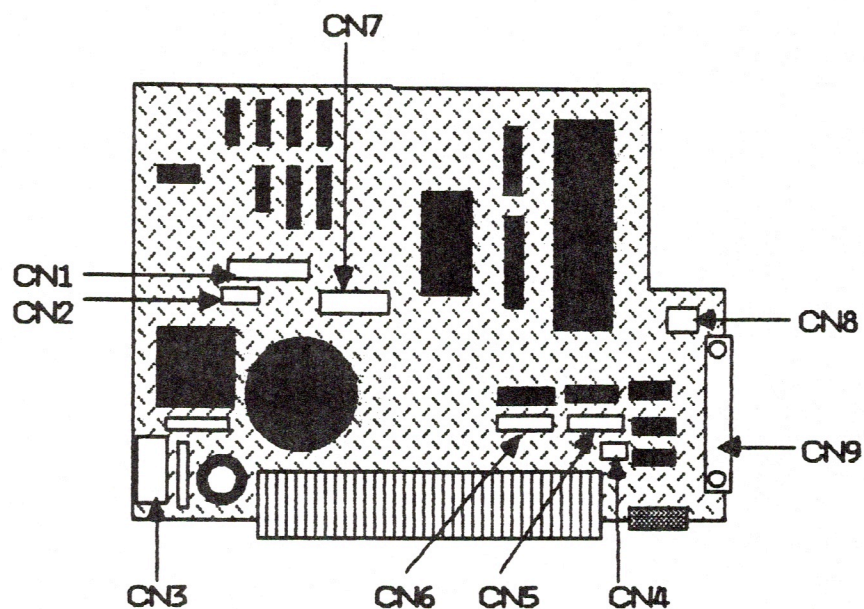
The DIP switches are located on the back side of the printer, near the serial interface connector, concealed under a removable cover. The switch cover can be pried off with a small flatblade screwdriver, and the eight numbered switches can be pushed up or down by hand or with a small screwdriver. On the Self Test or Loopback Test, the DIP switch settings are printed out as 1's or 0's in reverse order (87654321), as shown here:

DIPSW(00\*00000), '1=ON, 0=OFF

A 0 indicates that the switch is in UP position (= OFF), a 1 indicates DOWN position (= ON). Switch 6 is always shown as an asterisk (\*) rather than a 1 or 0, because it is an electrical switch rather than a firmware control. This does not mean that switch 6 is not functional: together with switch 5, it controls print intensity (see **Paper Requirements**, below).

A complete table of DIP switch functions and settings is found in the Scribe User's Manual, Part II: Reference, Appendix B.





## **Main Logic Board**

### **Connector Functions**

- CN1 - Out-of-Ribbon Sensor,  
Print Head Solenoid
- CN2 - Out-of-Paper Sensor
- CN3 - Connects to transformer, power supply.
- CN4 - Carriage Motor resistor
- CN5 - Paper Feed Motor
- CN6 - Carriage Motor
- CN7 - Control Panel Lights and Switches,  
Cover Interlock Switch
- CN8 - Left Margin (Home Position) Switch
- CN9 - Connector to Host Computer (I/O)

## PAPER REQUIREMENTS

The Scribe printer is a **thermal transfer printer**: a heated print head, applied to a special ribbon, transfers the ink from the ribbon onto ordinary (non-thermal) paper. Alternatively, the Scribe can be used with thermal paper, with or without a ribbon. Using a ribbon along with thermal paper results in a very sharp black image.

The Scribe works best with smooth paper, 16- to 24-pound weight, such as that used for copying machines. Ordinary pin-feed paper is satisfactory, but coarser grades may cause light and uneven print quality. Print intensity can be adjusted using DIP switches 5 and 6 as follows.

	Switch	Position
For normal density:	5	Up
	6	Up
For low density:	5	Up
	6	Down

The Scribe can also be used effectively with transparencies. When printing on transparencies, use the following settings:

	Switch	Position
For normal density:	5	Down
	6	Up
For low density:	5	Down
	6	Down

In general, the Scribe works best with smooth bond paper. If a customer complains of print quality problems, the paper being used should be examined first. Always use the optimum bond paper when running tests.

## MAIN LOGIC BOARD CONNECTOR FUNCTIONS

The diagram on the opposite page shows the functions controlled through the different cables connected to the Main Logic Board.



## PRINTER SELF-TEST AND LOOPBACK TEST

As a general check of the Scribe printer, a level 1 technician should run the Loopback Test in preference to the Printer Self-test, because it includes a check of the data-sending and -receiving lines and circuits.

### Printer Self-Test

The Printer Self-test allows the user to verify that the printer is operational. It prints out the ROM revision and DIP switch settings, and produces a print sample that can be used for print quality checks.

To run the Printer Self-test:

1. Make sure paper, ribbon, and top cover are installed.
2. Hold down the **line/form feed** button while turning the power on with the **power** button.

### Loopback Test

The loopback test is identical to the self-test except that it also checks ROM, RAM, and data-sending and -receiving functions. Whenever you check a printer, run the loopback test to check operation and communications ability. (**NOTE:** The Loopback Test does not test the "handshaking" ability or setting (DTR or XON/XOFF) of the Scribe; the printer could pass the loopback test and still have faulty handshake circuits.)

To run the loopback test:

1. Make sure paper, ribbon, and top cover are installed.
2. Connect a loopback connector (a standard DB-25 connector with pins 2 and 3 jumpered) to the serial port on the printer.
3. Hold down the **letter** button while turning the power on with the **power** button.

If the printer passes the test, the words "LOOPBACK TEST" will be printed, followed by the ROM revision number, DIP switch settings, and character set printout.

If the printer fails the test, no printing will occur; the **select** lamp will flash either a RAM check or Loopback error pattern (see **Section 4, Troubleshooting**, for error lamp display patterns). This will also happen if you try to run the test without a loopback connector installed.



## Disabling the Cover Interlock Switch

Like most printers, the Scribe contains a **cover interlock switch** that prevents it from functioning when the cover is removed. When you remove the printer cover (see **Section 2, Take Apart**), you will see the switch to the left of the **select** and **letter** switches. To run the Self-test or Loopback Test with the cover off, you can defeat the switch by wedging a piece of rolled-up paper or a similar non-metallic object in the switch opening.



# Scribe Printer Technical Procedures

## Section 2

### Take-Apart

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Control Panel Upgrade.....	2.18

**IMPORTANT:** There are two existing control panels for Scribe:

1. On the **original one-piece control panel**, the logic board cable is soldered to the panel, shielded with copper to pass RFI tests, and threaded through guides along the inside perimeter of the cover.
2. On the **newer two-piece control panel** there are two separate parts:
  - a. The control panel itself (connected to the cover), which has a short cable and connector soldered to it.
  - b. The logic board cable, which is mounted to the front of the mechanism assembly and runs underneath it to the logic board. When you exchange a mechanism assembly, this cable must be returned with the mechanism assembly module.

The take-apart procedures which follow are based on the original one-piece control panel configuration. For additional procedures specific to the newer two-piece control panel, see **Control Panel Upgrade** in this section.



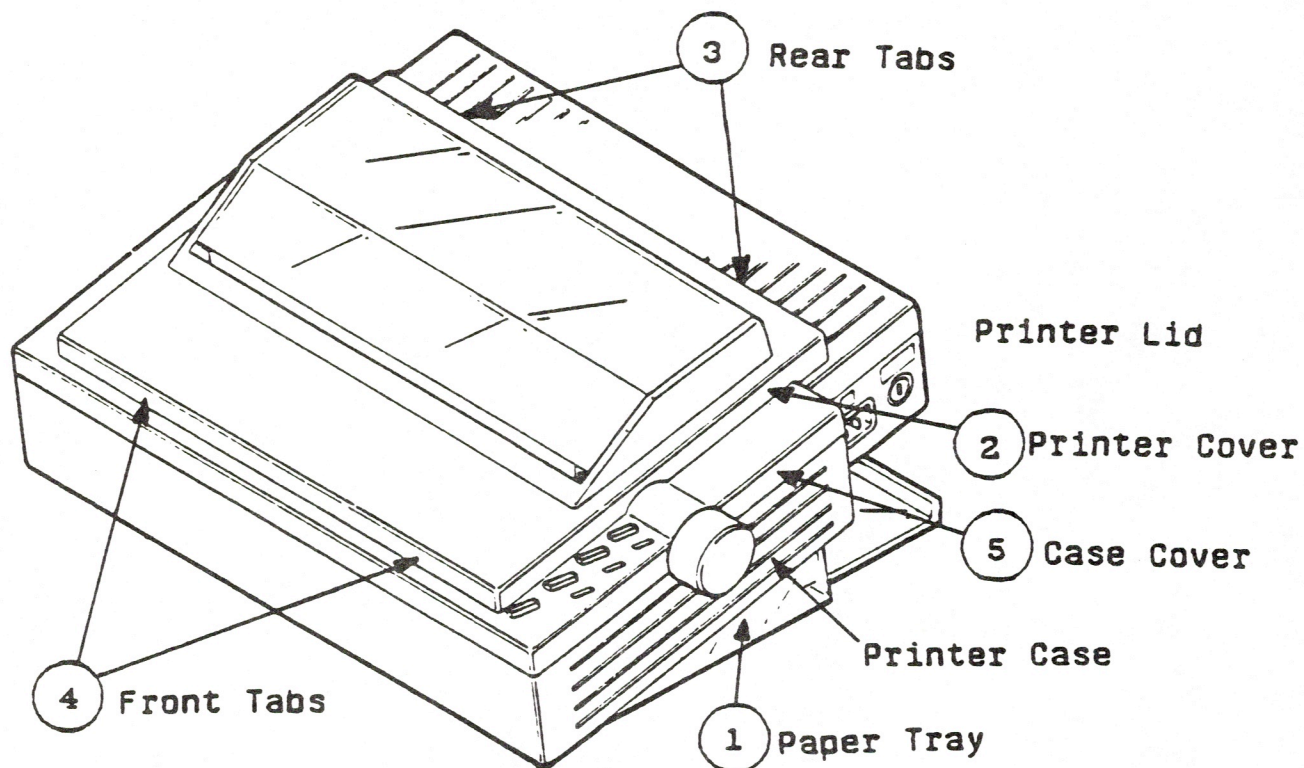


Figure 1

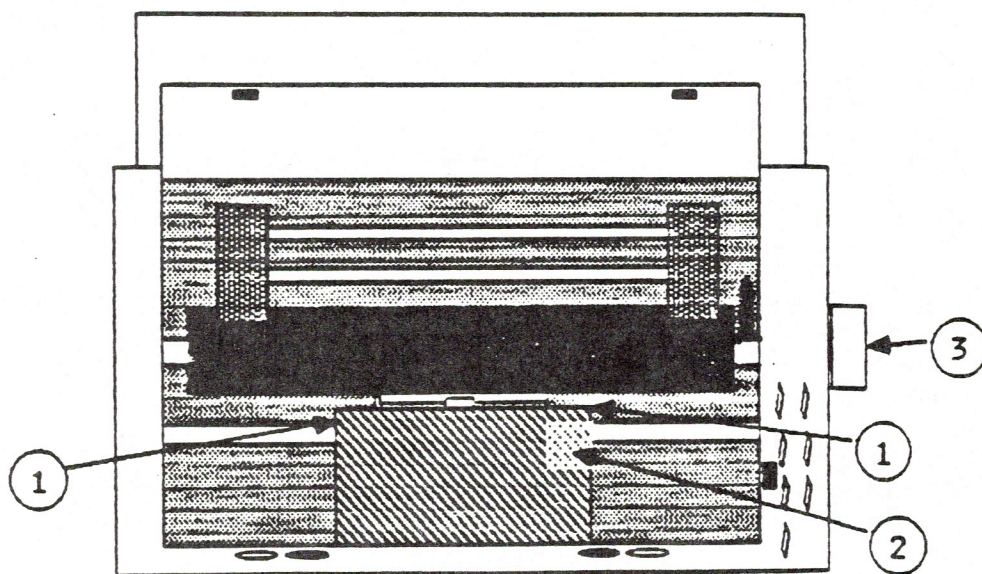


Figure 2

## REMOVING THE PRINTER ASSEMBLY FROM THE CASE

Required Tools: medium Phillips screwdriver (magnetized)  
small flatblade screwdriver  
needlenose pliers  
magnetic pick-up device or tweezers  
foam workpad or equivalent  
IC extractor (Apple P/N 918-0017)

Before you can perform any repairs or adjustments on the Scribe Printer, remove the printer assembly from the case according to the following instructions. **NOTE:** In all instructions that refer to "left" and "right," we assume that you are facing the front of the printer, where the Apple logo appears.

1. Turn off the power switch and remove the AC power cord from the printer.
2. Remove any paper from the printer, and lift the printer off the paper tray (Figure 1, #1) (if present).
3. Remove the translucent printer cover (Figure 1, #2) as follows:
  - a) Press forward on the back panel of the printer cover and lift it to free the two tabs in back (see Figure 1, #3).
  - b) Pull the cover slightly toward the back and up (to free the tabs in front - see Figure 1, #4).
4. Remove the ribbon cassette as follows:
  - a) Place your index fingers under the ribbon cassette, with one finger on each side, close to the platen (see Figure 2, #1).

**CAUTION:** The ribbon sensor is hidden under the cassette (see Figure 2, #2). Be sure that the finger on the right is under the **cassette** and not under the **ribbon sensor**.

- b) Lift up with your fingers until the cassette pops out. Then remove it from the printer.
5. Pull the platen knob (Figure 2, #3) off the platen shaft.
6. Remove the case cover (Figure 1, #5) as follows:



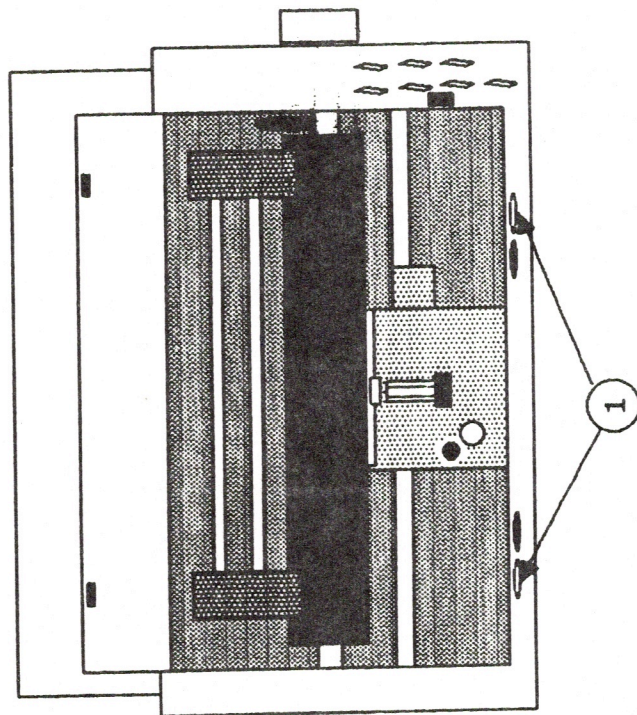


Figure 3

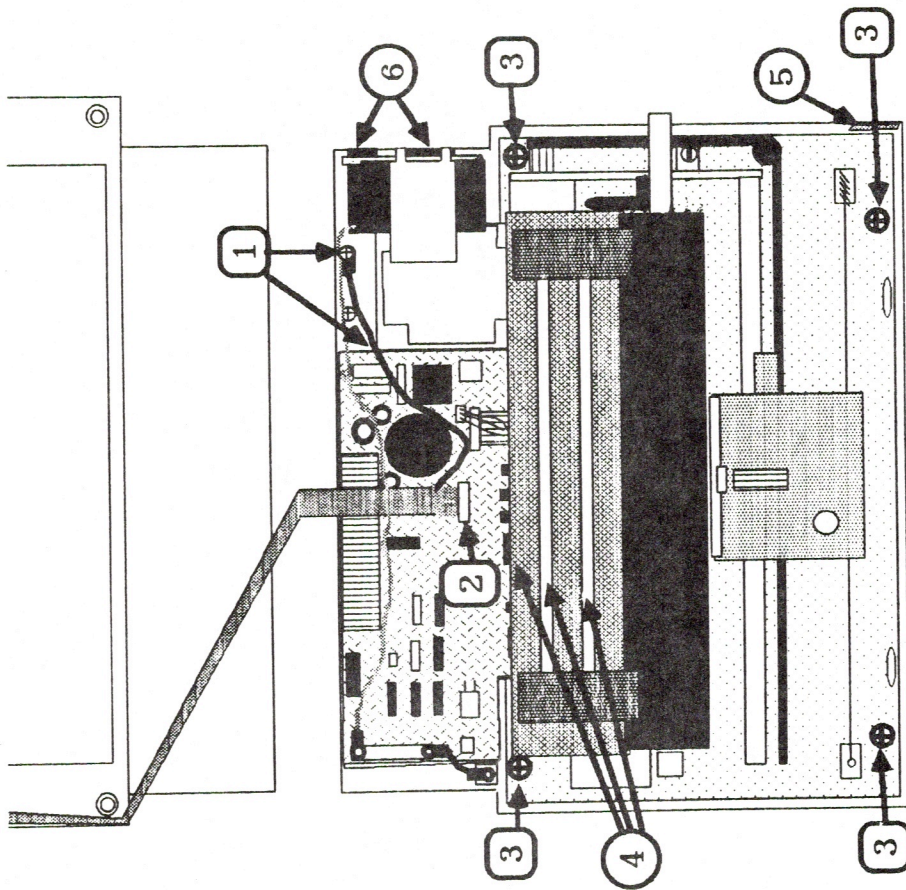


Figure 4



- a) Turn the printer over onto the workpad and remove the two screws on the bottom of the case.
  - b) Hold the case together and turn it right side up.
  - c) Free the ground wire from the right front corner of the baseplate by pushing on its connector with a screwdriver or needlenose pliers.
  - d) Locate the two tabs inside the front of the case (see Figure 3, #1). Notice the slots above the tabs on the inside of the front cover. To free the cover, push forward through the left slot with a small screwdriver while lifting up on the left corner of the printer cover. Repeat for the right tab.
  - e) Lift the front of the case cover up, pull the cover off its rear tabs, and lay it upside down behind the case; **DON'T STRAIN THE RIBBON CABLE** that connects the cover to the case.
  - f) Locate the ground wire that connects the ribbon cable to the rear of the chassis (Figure 4, #1). Free it from the chassis by removing the screw. **IMPORTANT:** Keep this screw with the ground wire. It is longer than the other chassis screws.
  - g) Disconnect the ribbon cable from the logic board by **pulling on the connector, not on the cable.** (See Figure 4, #2.)
  - h) Set the case cover aside.
7. Remove the four baseplate screws (Figure 4, #3).
8. Remove the printer assembly from the case as follows:
- a) Push the little grey cable-clamp out of the way (Figure 4, #5).
  - b) Grasp the assembly by the two metal rods and the back plate (Figure 4, #4) and lift it up, right side first, out of the case. (You may have to free the AC fuse holder and the power cord socket (Figure 4, #6) by prying outward on the case with a screwdriver or fingers as you begin lifting.)
  - c) Place the printer assembly on a stable work surface and set the case aside.

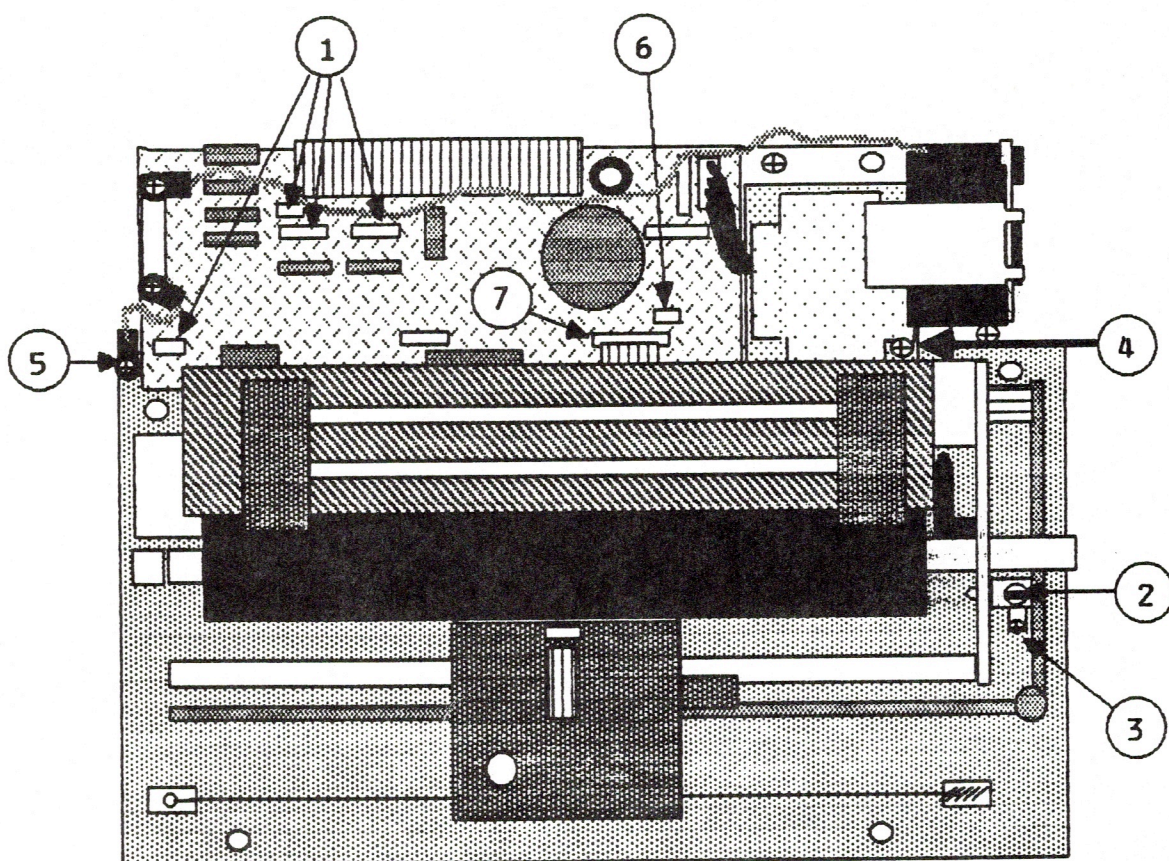


Figure 5



## SEPARATING THE MECHANISM ASSEMBLY FROM THE LOGIC BOARD ASSEMBLY

1. Disconnect the cables from the four leftmost sockets on the logic board (Figure 5, #1). Remember to pull on the cable connectors, not on the wires.
2. Remove the power switch (Figure 5, #2) from the right side of the mechanism assembly as follows:
  - a) Remove the screw at the base of the power switch (Figure 5, #3).
  - b) If you push the switch to the right, you will notice that it is held to the mechanism by a twisted metal tab. Use needlenose pliers to straighten the tab, and then push the switch free.
  - c) Carefully disengage the switch wires from their three plastic clamps and rest the switch near the logic board. DO NOT STRAIN THE SWITCH WIRES.
3. Remove the screw just to the right of the transformer (Figure 5, #4).
4. Remove the small screw at the far left that connects the mechanism assembly to the electrical assembly (Figure 5, #5).
5. Separate the two assemblies slightly by sliding the logic board away from the mechanism assembly, about one inch. Don't strain the cables that still connect the two assemblies.
6. Disconnect the cable next to the flat mylar cable (Figure 5, #6).
7. Disconnect the flat mylar print head cable (Figure 5, #7) from the logic board as follows:
  - a) Using the IC extractor, pull up the ceramic cable-holder about 1/8 inch (Figure 5, #7) to release the cable. DO NOT FORCE IT; DO NOT PULL THE CONNECTOR OFF. Be careful not to damage the mylar cable.
  - b) Pull the mylar cable out of the cable-holder. IT SHOULD SLIDE OUT EASILY: if it resists, pull the cable-holder up further. DO NOT FORCE THE CABLE.
8. Slide the assemblies apart.



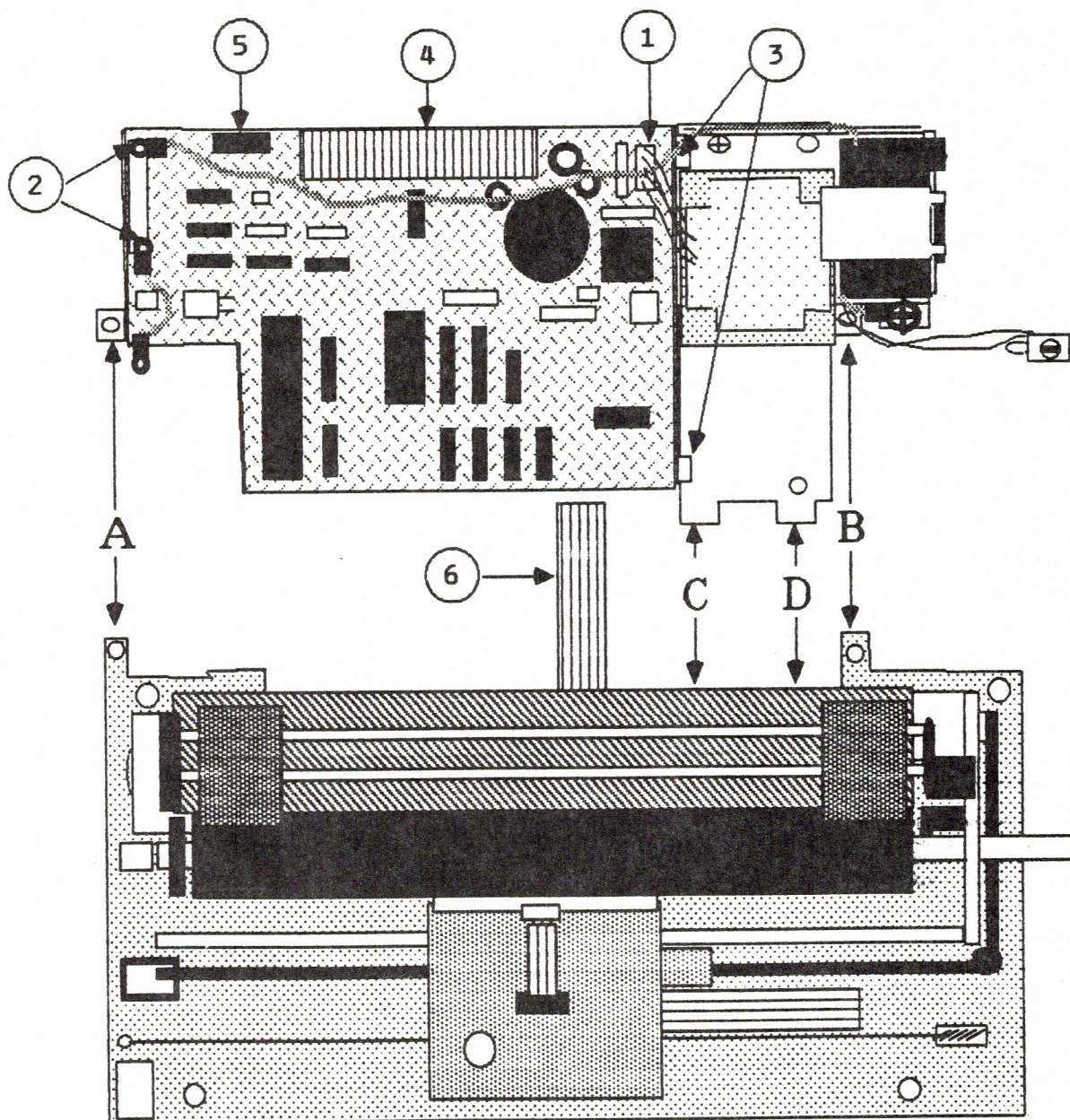


Figure 6

## REMOVING AND REPLACING THE LOGIC BOARD

### Remove

1. Disconnect the four-wire transformer plug from the logic board (Figure 6, #1).
2. Remove the two screws from the DB25 connector (Figure 6, #2) and set the ground wires aside.
3. Slide the logic board out from the small plastic clamps that hold it (Figure 6, #3), and set it aside.

### Replace

1. Slide the new logic board into the plastic clamps.
2. Line up the holes at the sides of the DB-25 connector with the screw holes in the baseplate.
3. Insert and fasten the DB-25 connector's screws with the ground wires under them, as follows:
  - a) The long ground wire from the right goes to the rear of the DB-25; route it in front of the heat sink (Figure 6, #4) and the DIP switches (Figure 6, #5).
  - b) The short ground wire (which you removed) goes to the front of the DB-25.
4. Connect the four-wire transformer plug to its socket (Figure 6, #1).

## CONNECTING THE LOGIC BOARD ASSEMBLY TO THE MECHANISM ASSEMBLY

1. Lay the Logic Board Assembly behind the Mechanical Assembly on a flat surface. (See Figure 6.)
2. Move all cables out of the way, so that none will be pinched or hidden when you push the assemblies together.
3. Make sure the mylar cable (Figure 6, #6) is lying on top of the logic board.
4. Slide the two assemblies together, making sure that Tabs A and B of the logic board lie under Tabs A and B of the mechanism assembly (see Figure 6).



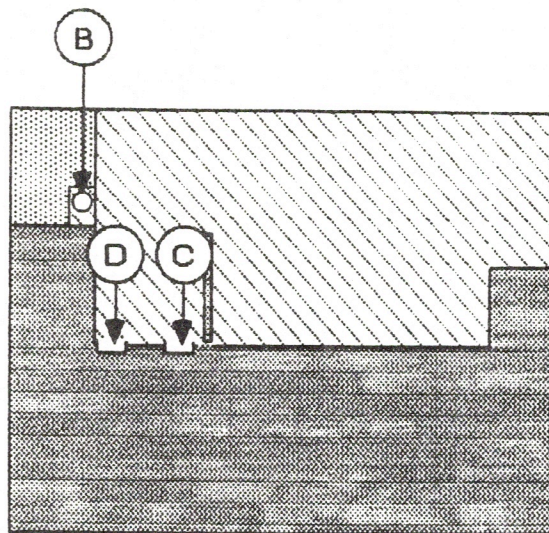


Figure 7

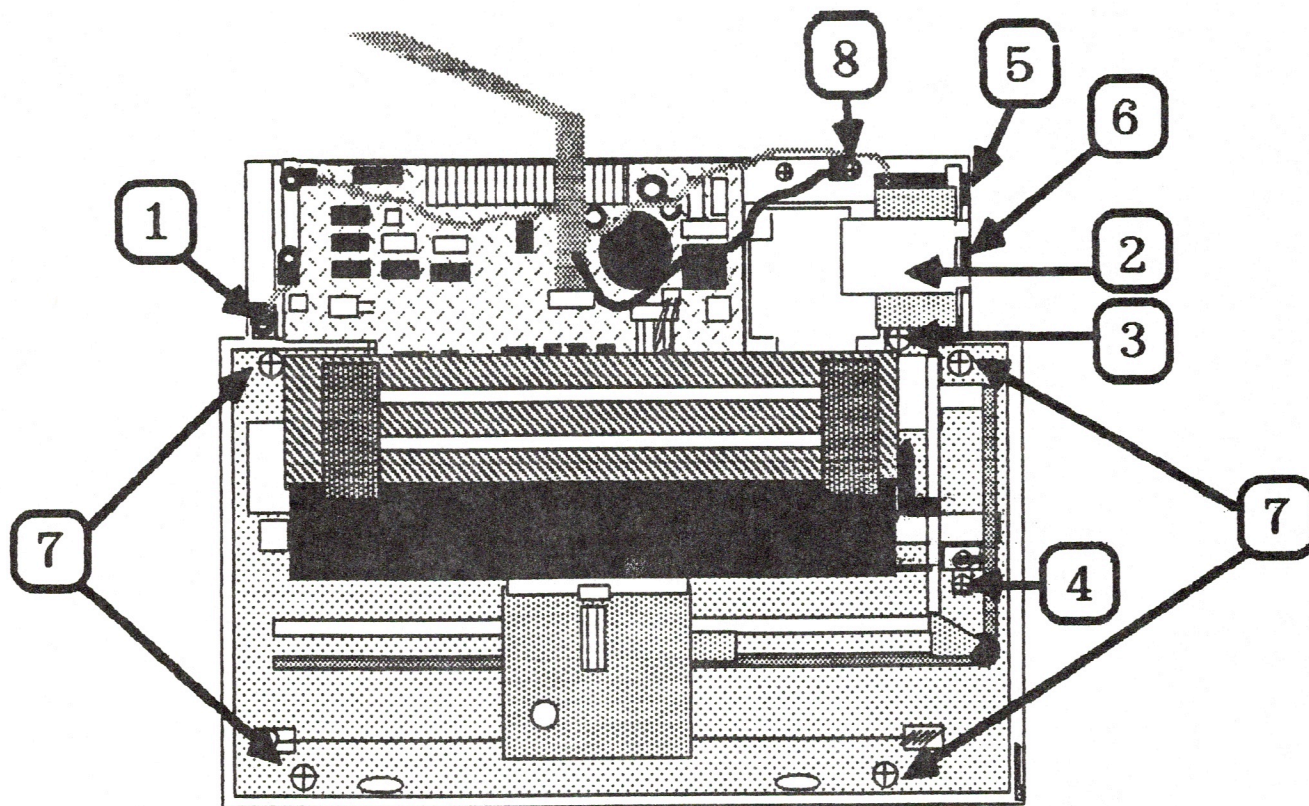


Figure 8



5. **IMPORTANT:** Lift up the two assemblies to make sure that tabs C and D on the logic assembly baseplate fit fully into slots C and D on the mechanism assembly baseplate (see Figure 7), and that tab B is correctly seated over its threaded hole. If the tabs are not correctly seated, repeat step 4.
6. Insert and tighten the small screw at the far left, with the short ground wire under it (Figure 8, #1).
7. Insert and tighten the screw next to the transformer (Figure 8, #3). You may have to move the noise filter and wires out of the way (Figure 8, #2 -- nothing is holding them down except friction).
8. Reconnect the mylar cable as follows:
  - a) Lift the ceramic cable-holder to full upward position (use fingers or IC extractor).
  - b) Hold the mylar cable as close to its end as possible, and insert it as far as it will go into the ceramic cable-holder.
  - c) Push down the ceramic cable-holder to lock the cable in position.
  - d) Gently tug on the mylar cable to test that it is held firm. If it moves, repeat steps a through c and test again.
9. Reconnect the five other cables (all except the ribbon cable) to the logic board. They are keyed by size and color so that you can see where they go.
10. Put the power switch back into place, reroute its wires under their three clamps, insert its tab into the proper slot, and refasten its screw (a small one) (see Figure 8, #4).
11. Retwist the tab on the power switch just enough to hold it.
12. Holding the printer assembly by the metal bars, lower it into the case, left side first, so that the DB25 connector slides into its slot first. (You may have to bend the front tabs out of the way to do this).
13. Make sure the AC fuse holder and the AC power cord socket (Figure 8, #5 and #6) fit into their slots in the case. If they don't, push them gently into place.

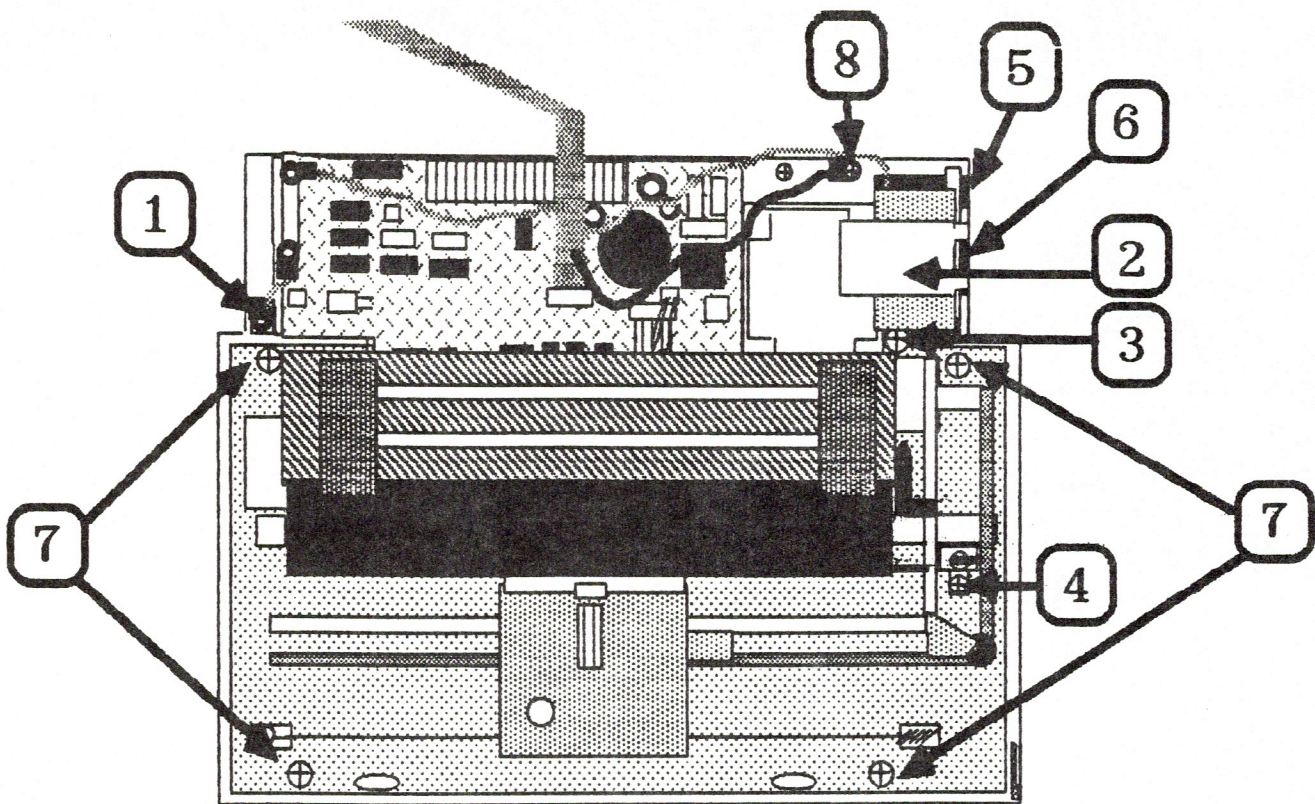


Figure 8

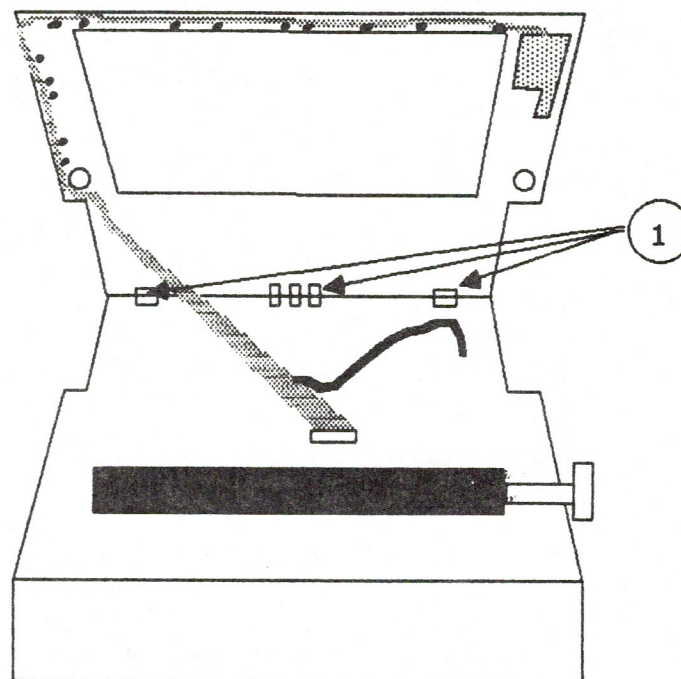


Figure 9



14. Replace and tighten the four screws at the corners of the black base-plate (Figure 8, #7). **NOTE:** These screws are all the same length. The similar but longer screw will be used later.

**CAUTION:** Be careful not to catch any wires under the screw at the left rear.

15. Make sure the ribbon cable in the case cover is seated behind the posts along the inner edge of the case cover. (See Figure 9.)
16. Plug the ribbon cable into the logic board.
17. Fasten the ribbon cable's ground wire to the right rear corner of the chassis with the long screw (Figure 8, #8).
18. Replace the case cover as follows:
  - a) Rest the back edge of the case cover on the back edge of the case, so that the tabs on the back edge of the cover are positioned properly (see Figure 9, #1).
  - b) Lower the front of the case cover so that the back tabs catch. Be careful not to pinch any loose cables between the case cover and the case.
  - c) Connect the ground wire at the right front of the baseplate and tuck it under the small grey clamp on the side of the case.
  - d) Push the front of the case cover onto the two front tabs until they click into place and hold it firmly. (You will have to push hard.)
  - e) Holding the case together, turn it upside down.
  - f) Replace the two screws in the bottom of the case.
  - g) Turn the case right side up.
19. Reinstall the platen knob.
20. Reinstall the ribbon cassette.
21. Reinstall the paper cover, front tabs first.
22. Place the printer on the paper tray.

**CONTINUED ON NEXT PAGE**

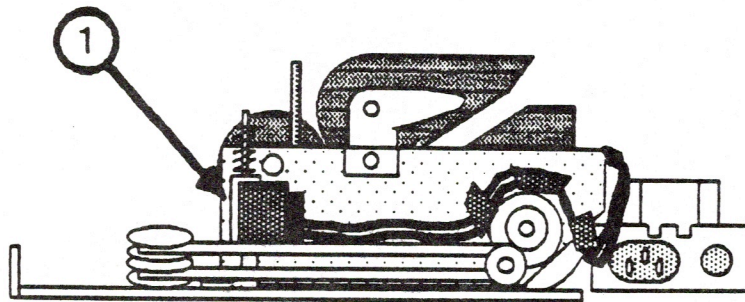


23. Install paper and run a self-test as follows:
- a) Make sure the power switch is in OFF position (up).
  - b) Connect the power cord.
  - c) Press the line/form feed switch and hold it down while pushing the power switch down. When the Scribe starts printing, release the line/form feed switch.

The self-test will run until you turn the power off.

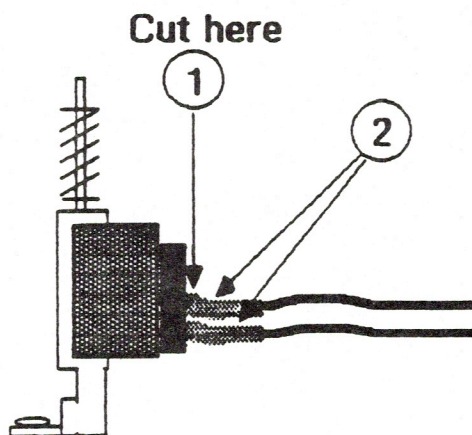
If the self-test will not run, re-open the case and check to make sure that you have correctly reinstalled all cables.

If the printer still does not function correctly, refer to **Section 4, Troubleshooting**.



Right side of printer assembly

**Figure 10**



**Figure 11**

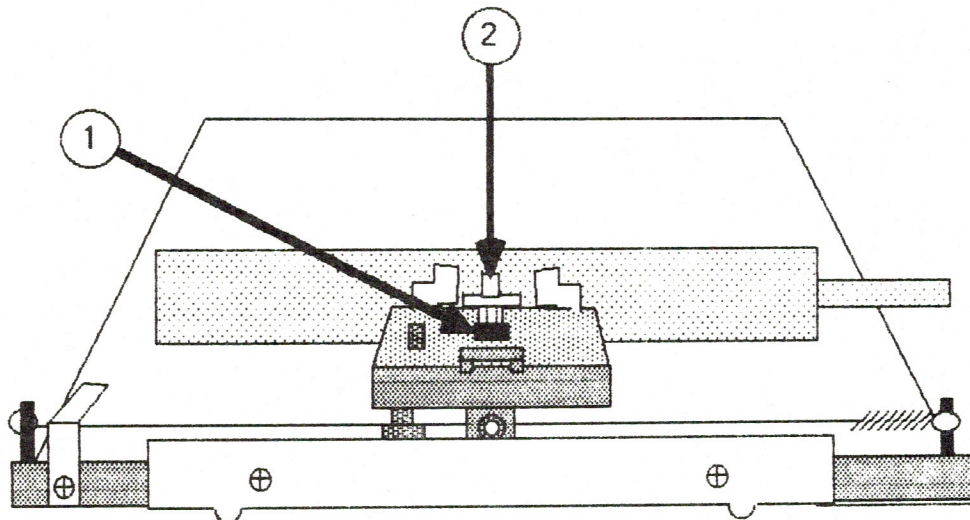
## REPLACING THE POWER SWITCH

### Recommended Tools:

Needlenose pliers	Soldering iron
Medium Phillips screwdriver	60/40 rosin-core solder
Diagonal cutters	Wire strippers
X-acto knife	Heat gun
Heat-shrink tubing (3/16 inch diameter)	

1. Remove the printer assembly from the case. (See procedure, above in this section.)
2. Remove the power switch (Figure 10, #1) from the right side of the printer assembly as follows:
  - a) Remove the screw at the base of the power switch.
  - b) If you push the switch to the right, you will notice that it is held to the printer by a twisted metal tab. Use needlenose pliers to straighten the tab, and then push the switch free.
  - c) Carefully disengage the switch wires from their three plastic clamps.
3. Cut the leads free from the faulty switch (see Figure 11, #1). **NOTE:** Cut the leads as close to the switch as possible.
4. Remove and discard the old shrink tubing (Figure 11, #2).
5. Strip about 3/8 inch of new wire on each lead.
6. Put a 3/4-inch length of new shrink tubing on each lead.
7. Attach the leads to the terminals of the new switch (either lead to either terminal) as follows:
  - a) Twist and tin a lead.
  - b) Insert the lead through the hole in either terminal.
  - c) Crimp the lead to ensure a good mechanical connection.
8. Solder the leads to the terminals.
9. Push the shrink tubing forward so that it covers the solder joint, and heat it with the heat gun until it shrinks to a snug fit around the joint.

10. Reroute the leads under the three plastic clamps and put the new switch in place.
11. Reinstall the screw at the base of the switch, put the tab through its slot in the side plate, and put a slight twist in the tab to hold the switch in place.
12. Reassemble the printer and run the Loopback test to check the repair.



**FIGURE 12**



## REMOVING AND REPLACING THE PRINT HEAD

### Remove

1. Turn the power on to center the print head, then turn the power back off.
2. Follow steps 1 through 6 of "REMOVING THE PRINTER ASSEMBLY."
3. Grasp the print head connector (Figure 12, #1) by the sides and progressively pull up to disconnect it. Rocking the connector back and forth as you lift will make it easier to remove.
4. Grasp the print head (Figure 12, #2) by the sides and pull up to disconnect it.
5. Remove the rubber cap from the top of the print head connector. Put the cap in a safe place -- you will have to install it over the new print head's connector.

### Replace

1. Install the rubber cap from the old print head connector over the new one.
2. Holding the print head by the sides, lower it into the grooves located at the front of the ribbon cassette holder. (See Figure 12.)
3. Carefully reconnect the print head connector to the circuit board connector at the center of the ribbon cassette holder. (See Figure 12, #2.)
4. Follow steps 18 through 22 of "CONNECTING THE LOGIC BOARD ASSEMBLY TO THE MECHANISM ASSEMBLY." (See page 2.13.)
5. Perform a Self Test to make sure that the Scribe is functioning properly. (See Section 4, Troubleshooting.)

## CONTROL PANEL UPGRADE

As noted at the beginning of this section, there are two existing control panels for Scribe. In the one-piece control panel (original) version, the cable is soldered to the control panel, shielded with copper to pass RFI tests, and threaded through guides around the inside perimeter of the cover.

In the newer control panel version, the cable is separate from the control panel. It is mounted instead to the front of the mechanism assembly and runs underneath it to the logic board. This cable is attached to the mechanism assembly with double-sided tape. **When you exchange a mechanism assembly this cable must be returned with the mechanism assembly module.**

New (purchased from stock) or exchange mechanism assemblies will have the cable attached or the Upgrade Assembly will be included. If the Upgrade Assembly is included, then install it on the mechanism assembly. The Upgrade Assembly contains the cable and a nut, bolt, and clip to hold the cable in place on the mechanism assembly.

There are two possible situations which involve the Upgrade Assembly when the mechanism assembly is exchanged:

1. If the customer's printer has the original control panel installed, ignore the cable installed under the exchange mechanism assembly (but make sure it is disconnected from the logic board). Connect the original control panel cable to the logic board.
2. If the customer's printer has the new control panel installed, simply connect the new control panel to the cable mounted on the mechanism assembly and connect the other end of the cable running underneath the mechanism to the logic board.

**NOTE:** Be sure to install the Upgrade Assembly on the mechanism assembly. Both are included in the Spares Kit.

# **Scribe Printer Technical Procedures**

## **Section 2: Take-Apart**

### **Appendix A: Optional Procedures**

#### **Contents:**

Replacing the Ribbon Drive Wire.....	2A.3
Replacing the Drive Belt.....	2A.7



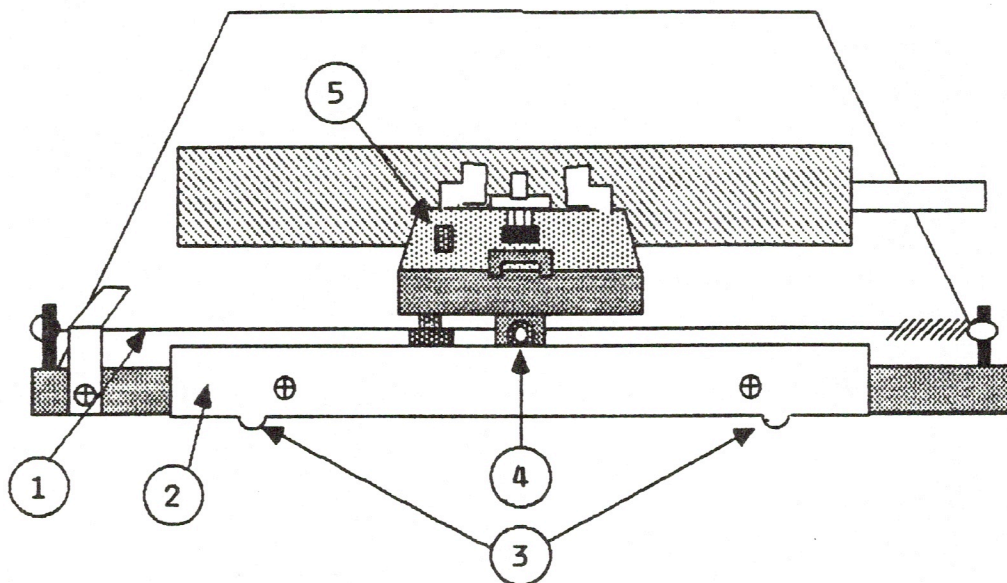


Figure 1

## REPLACING THE RIBBON DRIVE WIRE

Required Tools: medium Phillips screwdriver

**NOTE:** This procedure is optional at Level 1.

The ribbon drive wire (Figure 1, #1) is a thin, clear nylon filament, like fishing line, that turns a pulley to advance the ribbon as the carriage moves. If it breaks or becomes otherwise unusable, replace it as follows.

### To Remove:

1. Remove the printer assembly from the case (see Take-Apart procedures).
2. Remove the front guide bar (Figure 1, #2) from the mechanism assembly by removing its two screws.

**IMPORTANT:** Before removing the ribbon drive wire, note how it is routed around the ribbon drive pulley underneath the carriage assembly.

3. Grasp the spring at the right of the ribbon drive wire and remove it from its post.
4. Remove the spring from the wire.
5. Remove the wire from the pulley.
6. Remove the left side of the wire from its post.

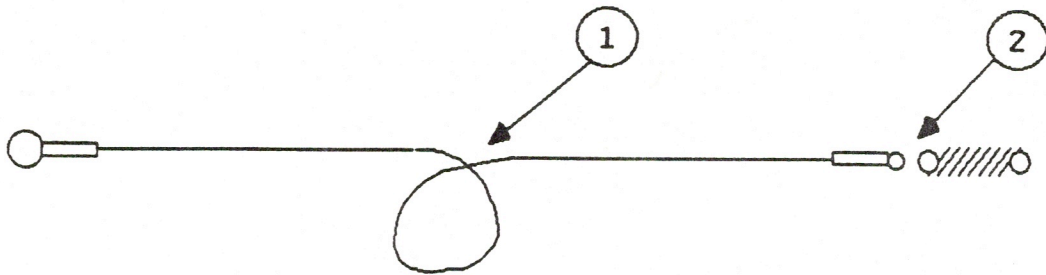


Figure 2

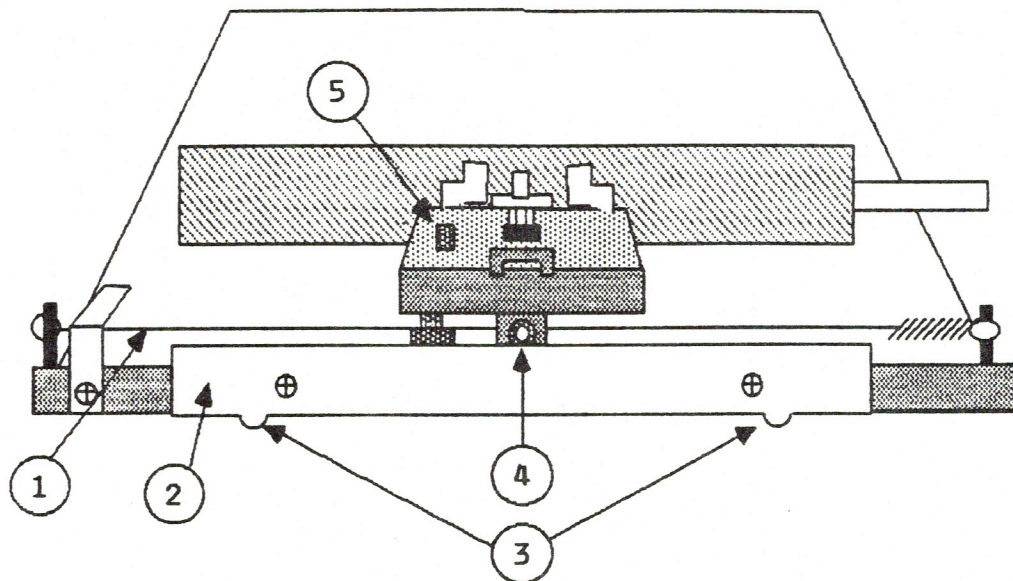


Figure 1



### To Replace:

1. Hook the large end-loop on the wire around the left post. Make sure the end-loop fits into the slots on the post.
2. Make a loop in the wire (see Figure 2) and fit it around the ribbon drive pulley beneath the carriage assembly. Make sure the crossover in the loop (Figure 2, #1) is at the rear of the pulley.
3. Pull the wire taut, so that it stays in place around the pulley.
4. Hook the **smaller** end-loop of the new wire through one hook of the spring. (See Figure 2, #2.)
5. Hook the spring to the right-hand post. Make sure the spring fits into the groove in the post.
6. Make sure the wire and spring look straight on both sides. If not, adjust them.
7. Replace the front guide bar as follows:
  - a) Rest the front roller of the carriage assembly on top of the front guide bar. (See Figure 1, #4.)
  - b) Line up the tabs on the guide bar (Figure 1, #3) with the tabs on the baseplate of the mechanism assembly.
  - c) Replace and tighten the two screws in the front guide bar.
8. To check that the installation was correct, press the print head against the platen with your finger while you move the carriage assembly across its track. The ribbon drive capstan (Figure 1, #5) should turn as the carriage moves from left to right. If it doesn't, readjust the wire.
9. Replace the printer assembly in the case (see procedure above).

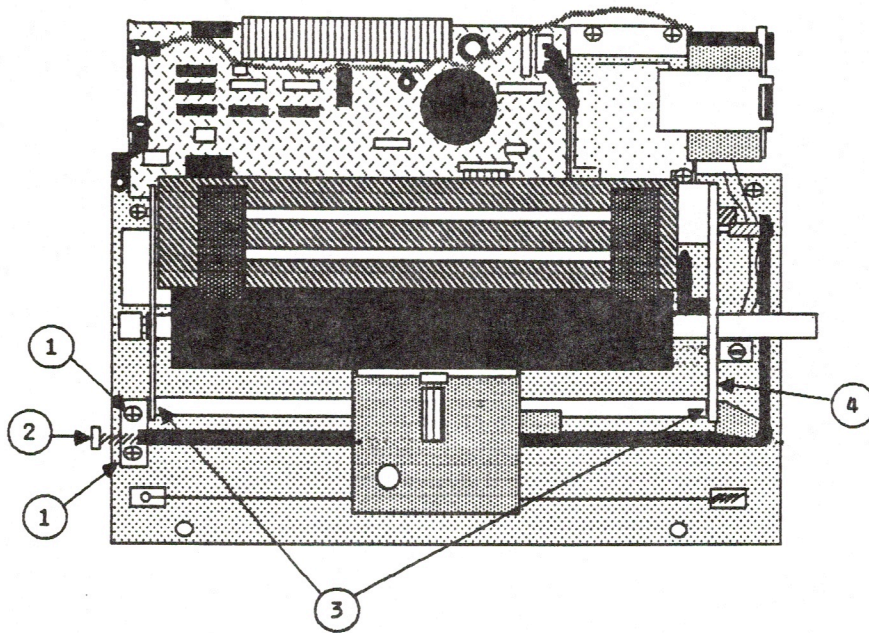


Figure 3

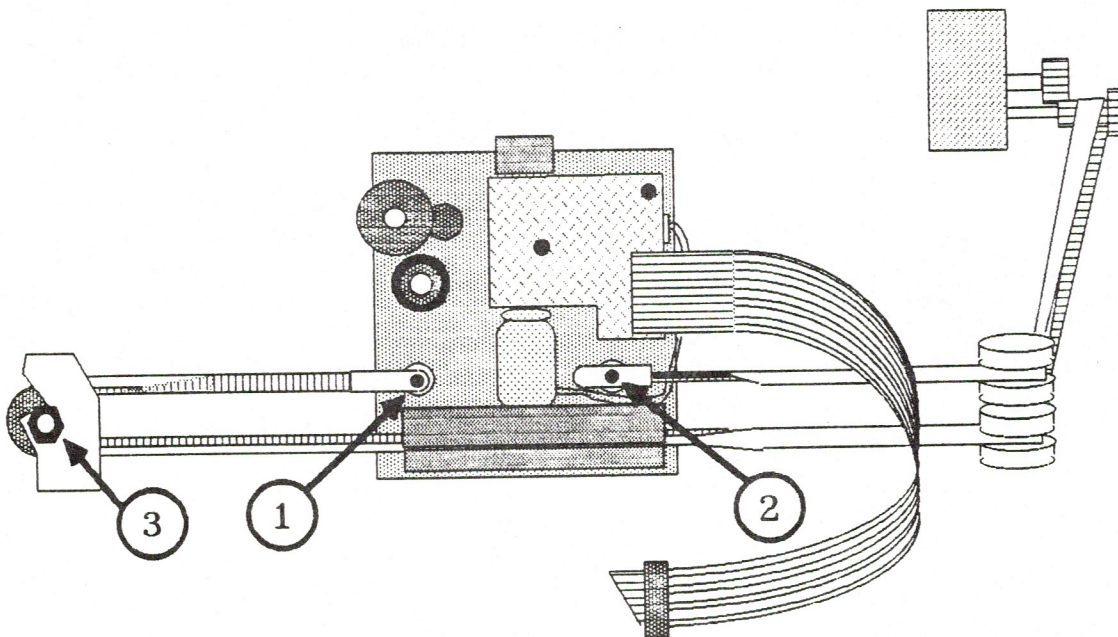


Figure 4



## REPLACING THE DRIVE BELT

Required Tools: Medium Phillips screwdriver  
5.5 mm nut driver or wrench, or  
small adjustable wrench

**NOTE:** This procedure is optional at Level 1. In any case, it should only be necessary if the belt is cut or otherwise damaged.

1. Remove the printer assembly from the case.
2. Loosen the drive belt as follows:
  - a) Loosen the two screws that hold down the belt tension bracket (Figure 3, #1).
  - b) Loosen the belt tension screw (Figure 3, #2) as far as possible without removing it.
3. Remove the front guide bar and ribbon drive wire (see **Replacing the Ribbon Drive Wire**, above.)
4. Remove the screws from the ends of the carriage shaft (Figure 3, #3).
5. Move the carriage assembly all the way to the left.
6. Lift the right end of the carriage shaft out of its socket. (You will have to push outward on the side plate. See Figure 3, #4.)
7. Slide the carriage shaft out from the carriage assembly and completely out of the machine.
8. Slide the carriage assembly to the middle of its track.
9. Remove the two clear plastic paper guides and the print head. (To remove them, pull up with a wiggling motion.)
10. Lift the near edge of the carriage assembly up and rest the assembly on its print-head side, so that its underside is facing you. (See Figure 4 for a view of the underside of the carriage assembly.)
11. Remove the screws from the two ends of the belt (Figure 4, #1 and 2).
12. Loosen the nut on the left-hand belt pulley (Figure 4, #3); then pull the pulley out of its holder and remove the belt. **IMPORTANT:** Be careful not to lose the pulley's washers.



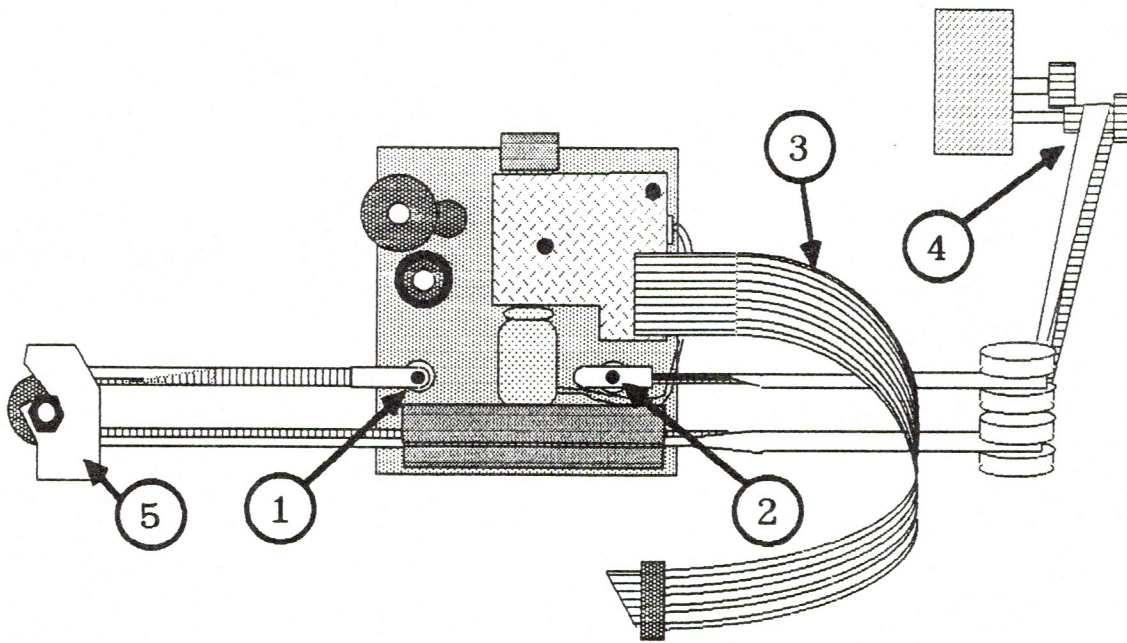


Figure 5

## Installing the New Belt

1. Attach either end-piece of the new drive belt to the right-hand mounting hole in the carriage assembly (Figure 5, #2) as follows:
  - a) Hold the belt so that the smooth side faces up.
  - b) Align the hole near the **midpoint** of the belt end-piece with the right-hand mounting hole in the carriage assembly (see Figure 5, #2).
  - c) Insert and tighten the screw, being careful not to pinch any wires.
2. Route the belt as in Figure 5:
  - behind the wide plastic cable (Figure 5, #3);
  - over the upper pulley on the right side (give the belt one 90° turn so that the ridges on the belt engage the ridges on the pulley);
  - around the carriage drive pulley (Figure 5, #4);
  - back over the lower right-hand pulley;
  - under the carriage assembly (with ridged side up);
  - and through the left hand pulley bracket (Figure 5, #5) (from which you removed the pulley).
3. Replace the left-hand pulley in its slot. The small washers on each side go **inside** the slot. The large washer goes on the outside at the front, under the nut.

**IMPORTANT:** Do not overtighten the nut. If you do, it may cause a home position error.
4. Route the loose end of the belt around the pulley, and line up the end-piece of the belt with the left hand mounting hole on the carriage assembly (see Figure 5, #1). (You will have to turn the belt 90° so that the ridges on the belt face toward you and the hole at the **end** of the end-piece lines up with the mounting hole.)
5. Attach the end-piece to the carriage assembly.
6. Turn the carriage assembly right side up and move it all the way to the left.

7. Put the carriage shaft back through the carriage assembly. (The small rubber bumper goes to the right side.)
8. Fit the carriage shaft into its sockets and replace the two screws that hold it in place.
9. Replace the ribbon drive wire and front guide bar (see above).
10. Replace the print head (including the rubber cap on its connector) and the plastic paper guides.
11. Adjust the drive belt tension (see **Section 3, Adjustments**).
12. Move the carriage assembly back and forth along its track, observing to make sure that it is correctly installed.



# **Scribe Printer Technical Procedures**

## **Section 3**

### **Adjustments**

#### **Contents:**

Drive Belt Tension Adjustment.....	3.3
Print Head Adjustment.....	3.7

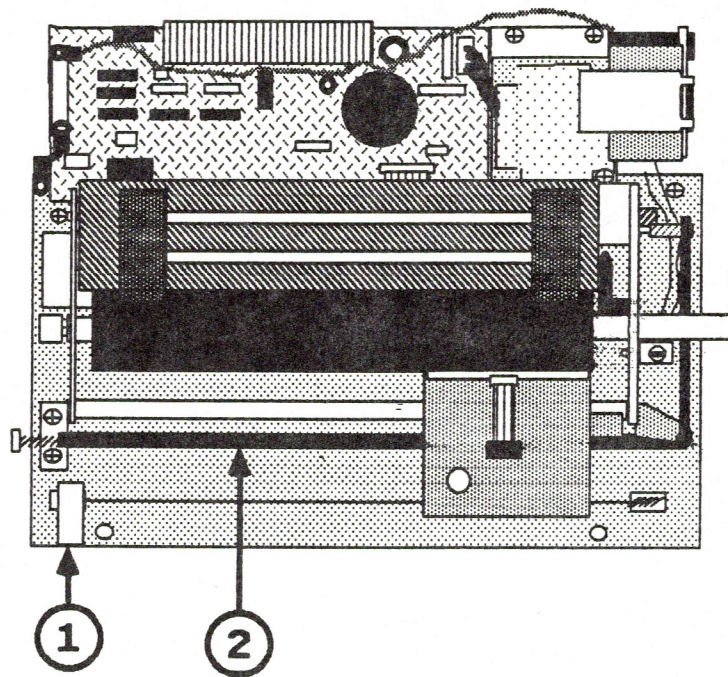


Figure 1

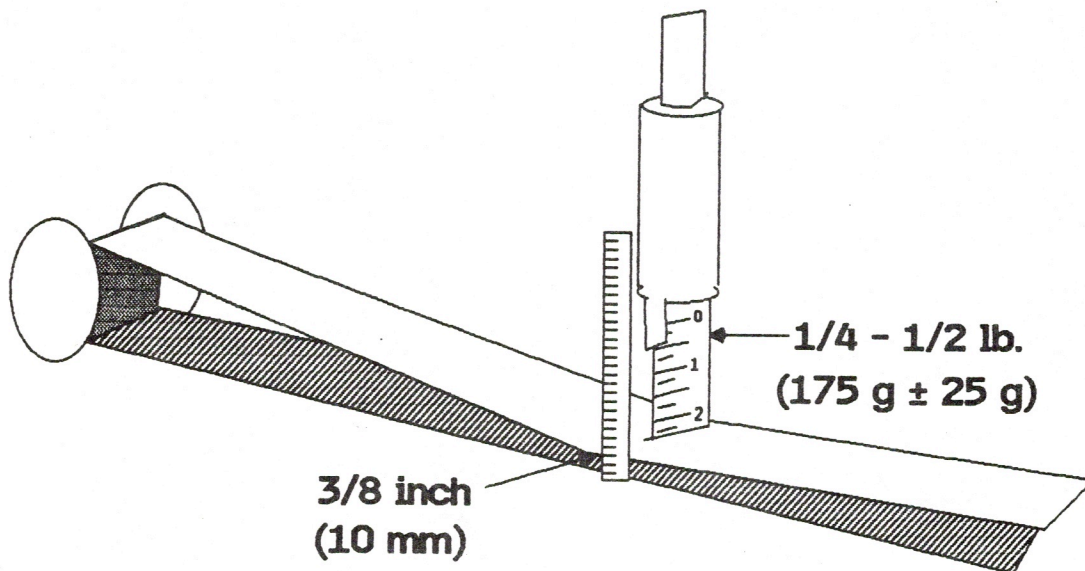


Figure 2

## DRIVE BELT TENSION ADJUSTMENT

Required Tools: spring gauge (P/N 077-0014 or equivalent)  
Metric ruler  
5.5 mm nutdriver or wrench,  
or small adjustable wrench  
Medium Phillips screwdriver

The Scribe Printer often produces a small **horizontal registration** error (a slight unevenness line-to-line) at column 0 (the left margin). This unevenness is difficult to remove and should be considered normal. Horizontal registration errors (uneven vertical lines) elsewhere on the page are not acceptable and are correctable by adjusting the belt tension.

Faulty drive belt tension can also cause **home position** errors (see Section 4, **Troubleshooting**, p.4.6-4.8 for error indications). In the case of a home position error, make sure that the home position sensor switch (Figure 1, #1) is firmly attached to the chassis before you try the belt tension adjustment. If there is any play in the sensor switch mounting, tighten the screw. This may solve the problem without belt tension adjustment.

### To Measure Belt Tension:

1. Remove power from the printer and disconnect the power cord.
2. Remove the printer cover.
3. Move the carriage assembly all the way to the right.
4. Position the spring gauge on the top portion of the drive belt, halfway between the carriage assembly and the left-hand belt pulley. (See Figure 1, #2.)
5. Press down on the drive belt with the gauge until the top of the belt is 10 millimeters (about 3/8 inch) from the bottom plate of the printer (see Figure 2). The spring gauge should read between 1/4 and 1/2 pound (175 g, + or - 25 g).
6. If the spring gauge reading is outside that range, tighten or loosen the belt according to the steps below.



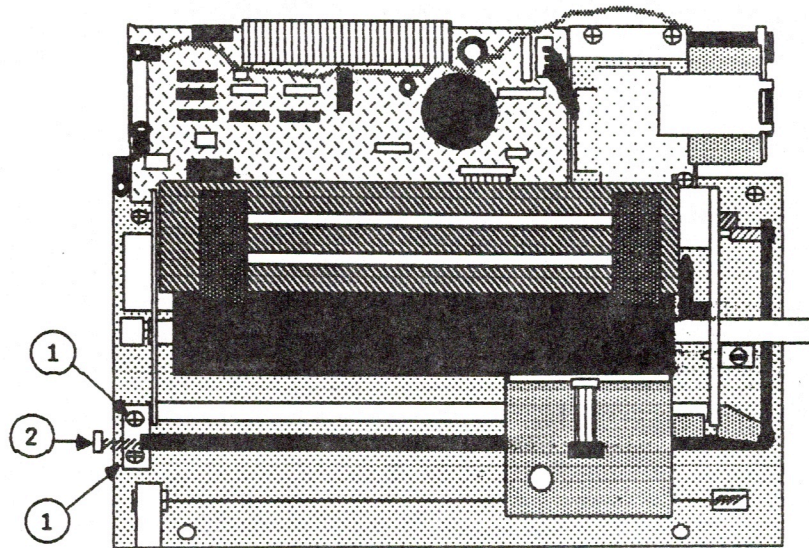


Figure 3

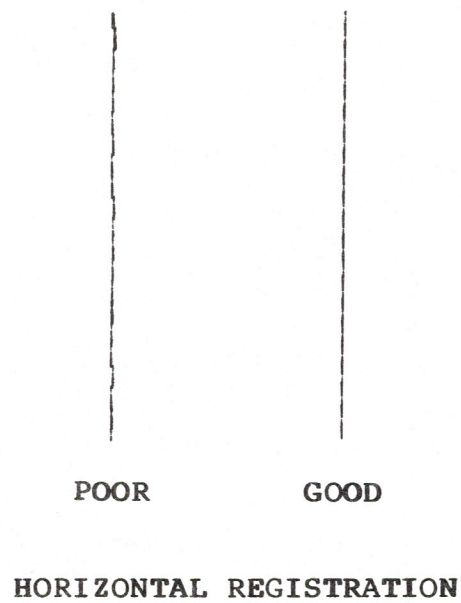


Figure 4

### To Adjust Belt Tension:

1. Remove power from the printer and disconnect the power cord.
2. If you use a very thin 5.5 mm wrench, you may be able to reach the drive belt adjustment screw (Figure 3, #2) by removing the case cover only. Otherwise, remove the printer assembly from the case. (Refer to **Section 2, Take-Apart**, for instructions.)
3. To tighten or loosen the belt:
  - a) Loosen the two belt pulley screws (Figure 3, #1).
  - b) Turn the drive belt adjustment screw (Figure 3, #2) clockwise to tighten, or counterclockwise to loosen the belt.
  - c) Tighten the two belt pulley screws (to prevent measurement error).
  - d) Measure the tension again and repeat steps a-c if necessary.
  - e) When the tension is correct, make sure the two belt pulley screws are tightened.
4. Test the adjustment by printing a sample file that includes straight vertical lines. (See Figure 4 for samples of good and poor horizontal registration.) If the lines are not straight (except at the left margin), readjust the belt tension until they are.

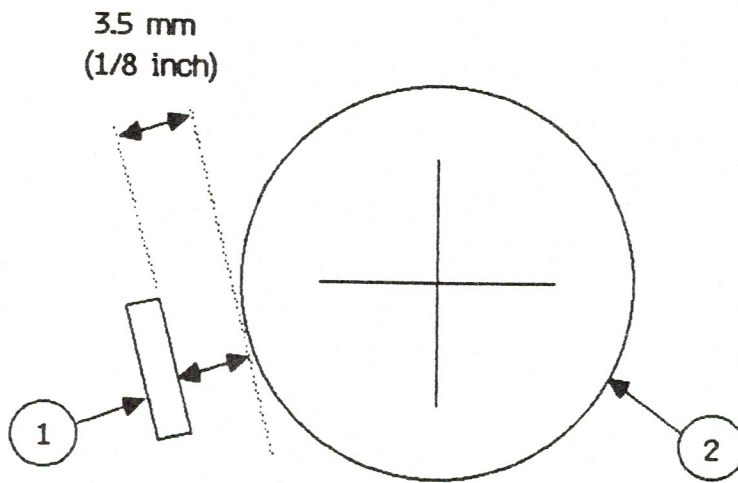


Figure 5

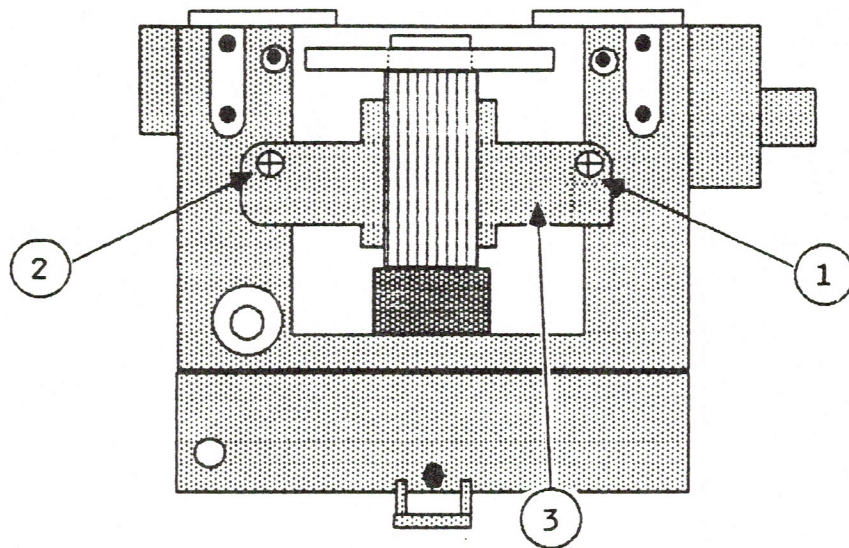


Figure 6



## **PRINT HEAD ADJUSTMENT**

If the print head is too far from the platen, printing will be uniformly light. If it is too close, printing may be too black and overlaid with a grey smear.

### **Measuring the print head gap**

1. Remove the ribbon cassette from the printer.
2. Remove the clear plastic paper guide from the left-hand side of the carriage assembly (it pulls off).
3. Measure the distance between the print head (Figure 5, #1) and the platen (Figure 5, #2). The gap should be 3.5 mm, + or - 0.5 mm (about 1/8 inch).

### **Adjusting the print head gap**

1. Remove the ribbon cassette from the printer.
2. Loosen but do not remove the adjustment screw on the right (Figure 6, #1).
3. Loosen the left-hand screw (Figure 6, #2) just enough to allow movement of the print head positioning plate (Figure 6, #3). (It pivots at the left side and moves at the right.)
4. Move the print head forward or back until the gap is correct (3.5 mm or 1/8 inch).
5. Tighten the screws.
6. Measure again to verify adjustment. Read just if necessary.
7. Run the self-test to verify that the adjustment has solved the problem. Read just if necessary.
8. Make sure to reinstall the clear plastic paper guide when you finish.



## **Scribe Printer Technical Procedures**

### **Section 4**

#### **Troubleshooting**

##### **Contents:**

Initial Checks.....	4.3
Self-Test.....	4.5
Instructions for Using the SYMPTOM TABLES.....	4.5
Symptom Tables (Error Conditions).....	4.7
Symptom Tables (Print Quality Problems).....	4.9
Symptom Tables (Abnormal Printer Operation).....	4.11

**NOTE:** The Scribe printer should be tested the Apple II  
Peripherals Diskette. (See **Multi-Product Diagnostics**  
**Technical Procedures, Section 1.**)





To troubleshoot the SCRIBE printer, first perform the Initial Checks below; then if the problem is not found, try running the self-test and use the SYMPTOM TABLES to diagnose the problem. All repairs must be verified by passing the self-test.

## INITIAL CHECKS

Inspect everything visually, including:

_____ Power Cord (if available)	insulation cracks evidence of burning misformed from excessive bending ground plug missing from power cord
_____ Printer Case	burn marks case has been opened by user evidence of having been dropped (cracks in case, paper tray, or cover)
_____ Ribbon Cassette	no ribbon installed out of ribbon ribbon torn ribbon drive cable broken
_____ Print Head	print head appears damaged print head cable incorrectly installed
_____ Platen	platen dirty or damaged labels stuck on platen paper or labels stuck in feed path





## **SELF-TEST**

1. Make sure paper is installed; press and hold down the LINE/FORM FEED key on the control panel and then turn the power on. The printer should print a repetitive alpha-numeric pattern.
2. If the self-test does not pass or if the print quality is poor, note the symptoms and go to the SYMPTOM TABLES

## **INSTRUCTIONS FOR USING THE SYMPTOM TABLES**

Equipment Required:      Phillips screwdriver  
                             flatblade screwdriver  
                             needlenose pliers  
                             ruler  
                             loopback connector  
                             IC extractor (Apple PN# 918-0017)  
                             Tension gauge (Apple PN# 077-0014)

### **Procedures:**

1. Locate the symptom in the tables that most nearly matches the observed symptoms of the printer being repaired.
2. Perform the corrective actions, in the sequence listed, until the failure has been diagnosed and repaired. If the problem is not found using the corrective actions given, locate another symptom that is similar, and follow the corrective actions for that symptom.
3. If the symptoms you observe are not found in the tables, replace the logic board (it can cause the greatest variety of symptoms).

**NOTE:** The word "check", as used in the tables, means to visually inspect and/or manually test for loose connections, burned components, mechanical binding, breaks or tears, looseness or tightness, etc.

When the tables say to "replace" a module, be sure to return the original module to the system if the replacement did not repair the problem. Do this before you replace another module. The tables are given in the following pages.

Home Position Error  
(Left Margin)



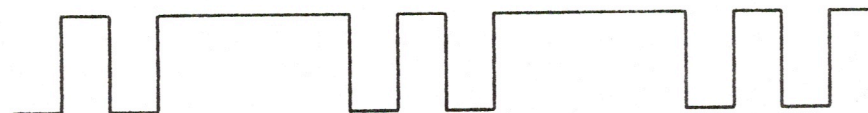
Ribbon End Error



Paper End Error



Loopback Test Error



RAM Check Error



FIGURE 1

**SYMPTOM TABLES**  
**ERROR CONDITIONS**

Certain error conditions are indicated by the SELECT lamp on the Scribe control panel blinking on and off in various patterns. Figure 1 indicates the different patterns and their meanings.

SYMPTOM	CORRECTIVE ACTION
Select lamp flashes slowly (Paper End Error)	<ol style="list-style-type: none"><li>1. paper is out, insert paper</li><li>2. paper is inserted too far to the right</li><li>3. clean paper detect sensor</li><li>4. replace logic board</li><li>5. replace mechanism assembly due to a defective paper detect sensor</li></ol>
Select lamp flashes rapidly (Ribbon End Error)	<ol style="list-style-type: none"><li>1. remove and reseal ribbon cassette</li><li>2. replace ribbon cassette and press select switch</li><li>3. replace mechanism assembly, due to a defective out of ribbon detect sensor</li><li>4. replace logic board</li></ol>
Select lamp flashes rapidly three times followed by a pause and then three more rapid flashes (Ram Check Error)	<ol style="list-style-type: none"><li>1. replace logic board</li></ol>



SYMPTOM	CORRECTIVE ACTION
Select lamp flashes rapidly two times followed by a pause and then two more rapid flashes (Home Position Error)	<ol style="list-style-type: none"> <li>1. check that nut on left drive belt pulley is not overtightened.</li> <li>2. check carriage belt tension</li> <li>3. replace mechanism assembly</li> </ol>
Select lamp flashes once followed by a pause and then another flash (Loopback Test Error)	<ol style="list-style-type: none"> <li>1. check loopback connector is securely connected</li> <li>2. replace logic board</li> </ol>
Select lamp flashes very fast (no error condition); printer doesn't operate	<ol style="list-style-type: none"> <li>1. replace ribbon</li> <li>2. replace logic board</li> </ol>
Select lamp lit continuously, carriage does not move	<ol style="list-style-type: none"> <li>1. check baud rate setting of DIP switch</li> <li>2. replace interface cable</li> <li>3. replace logic board</li> </ol>

## PRINT QUALITY PROBLEMS

SYMPTOM	CORRECTIVE ACTION
Print is light	<ol style="list-style-type: none"><li>1. check that the type of paper being used is appropriate (refer to User's manual)</li><li>2. check DIP switch setting is appropriate for paper type being used (refer to User's Manual)</li><li>3. replace ribbon cassette with new one</li><li>4. check ribbon drive wire is connected and drive pulley is turning</li><li>5. check print head is clean</li><li>6. check print head gap</li><li>7. replace print head</li><li>8. replace ribbon drive wire</li><li>9. replace logic board</li></ol>
Print is dark	<ol style="list-style-type: none"><li>1. check DIP switch setting is appropriate for paper type being used</li><li>2. replace print head</li><li>3. replace logic board</li></ol>
Print density varies while printing on any type of paper	<ol style="list-style-type: none"><li>1. replace ribbon cassette</li><li>2. check ribbon feed mechanism, and replace mechanism assembly if defective</li><li>3. check ribbon drive wire</li></ol>

SYMPTOM	CORRECTIVE ACTION
Printer prints solid black line but operates normally otherwise	<ol style="list-style-type: none"> <li>1. replace print head</li> <li>2. replace logic board</li> </ol>
Improper vertical spacing, prints on top of another line	<ol style="list-style-type: none"> <li>1. check paperfeed motor and gears for binding</li> <li>2. check platen and platen gear</li> <li>3. check pin feed tractor</li> </ol>
Poor horizontal print registration	<ol style="list-style-type: none"> <li>1. check tension of carrier belt</li> </ol>
Printing distorted	<ol style="list-style-type: none"> <li>1. check that the correct type of paper is used (try smoother paper)</li> <li>2. check for proper feeding of paper</li> <li>3. check that print head is clean</li> <li>4. replace print head</li> <li>5. replace mechanism assembly</li> </ol>
Excessive background (smudge) when no printing is present	<ol style="list-style-type: none"> <li>1. replace ribbon with new one</li> <li>2. check DIP switch settings</li> <li>3. adjust print head gap</li> </ol>
Platen does not turn, prints over same line	<ol style="list-style-type: none"> <li>1. check DIP switch settings</li> <li>2. check paper feed gears</li> <li>3. check for objects obstructing the feed path</li> <li>4. check paper feed motor connector (CN5) is securely connected to logic board</li> </ol>



## ABNORMAL PRINTER OPERATION

SYMPTOM	CORRECTIVE ACTION
Carriage doesn't move; power lamp not lit	<ol style="list-style-type: none"><li>1. check power cord plugged in securely</li><li>2. check line fuse (on outside of case, near power cord connector)</li><li>3. check fuse FU2 on logic board</li><li>4. replace logic board</li><li>5. replace AC power switch</li><li>6. return unit to Level 2 for replacement of noise filter or transformer</li></ol>
Power lamp on, all other lamps off and printer doesn't operate	<ol style="list-style-type: none"><li>1. replace logic board</li></ol>
All control panel lamps are lit, but printer doesn't operate	<ol style="list-style-type: none"><li>1. replace print head</li><li>2. replace logic board</li></ol>
Power lamp not lit but carriage moves and prints normally	<ol style="list-style-type: none"><li>1. check that the control panel connector (CN7) is securely connected to the logic board</li><li>2. replace control panel board</li></ol>

SYMPTOM	CORRECTIVE ACTION
Carriage moves, but does not print	<ol style="list-style-type: none"> <li>1. check ribbon installed for plain paper printing</li> <li>2. if no ribbon installed, check that thermal paper has the thermal side facing the print head</li> <li>3. check the print head cable is properly connected</li> <li>4. replace thermal print head</li> <li>5. replace logic board</li> </ol>
Abnormal noise when printer is turned on	<ol style="list-style-type: none"> <li>1. check for objects that may have dropped into printer</li> <li>2. check drive belt for tear or looseness</li> <li>3. check for broken or misaligned gears</li> <li>4. check for loose/dirty carriage shaft</li> <li>5. check for defective connections at CN3, CN4, and CN6 by lightly moving connector wires</li> <li>6. replace logic board</li> </ol>
Humming noise when printer is turned on; printer does not operate; all indicator lamps are lit	<ol style="list-style-type: none"> <li>1. check that the print head cable is correctly installed</li> <li>2. replace logic board</li> </ol>

SYMPTOM	CORRECTIVE ACTION
Paper feed is irregular	<ol style="list-style-type: none"> <li>1. check release lever is set to proper position</li> <li>2. check paper is inserted correctly</li> <li>3. check proper paper type is being used (card stock and onion skin types are not recommended)</li> <li>4. check for proper spacing between sprockets (when using pin feed - refer to chapter 2 of the User's Manual)</li> <li>5. check for broken tractor pins</li> <li>6. check platen gear for cracks or binding</li> <li>7. Check print head gap</li> <li>8. lubricate platen bearings</li> <li>9. replace logic board</li> </ol>
Paper does not feed	<ol style="list-style-type: none"> <li>1. check motor gears for looseness or damage</li> <li>2. check sprocket gears for looseness or damage</li> <li>3. check paper feed motor connector (CN5) is securely connected to logic board</li> <li>4. replace logic board</li> </ol>



SYMPTOM	CORRECTIVE ACTION
Control panel keys do not operate properly	<ol style="list-style-type: none"> <li>1. check control panel cable connector (CN7) is securely connected to the logic board</li> <li>2. replace control panel</li> <li>3. replace logic board</li> </ol>
Prints without paper	<ol style="list-style-type: none"> <li>1. clean paper detect sensor</li> <li>2. replace mechanism assembly due to a defective paper detect sensor</li> <li>3. replace logic board</li> </ol>
Carriage strikes against end	<ol style="list-style-type: none"> <li>1. check that nut on left drive belt pulley is not overtightened.</li> <li>2. check drive belt tension</li> <li>3. check home position switch; replace mechanism assembly if defective</li> <li>4. check connector (CN8) securely connected</li> <li>5. replace logic board</li> </ol>
Carriage moves to center and stops after power is turned on	<ol style="list-style-type: none"> <li>1. install paper and/or ribbon cassette</li> <li>2. replace logic board</li> </ol>
Carriage moves to right when power is turned on, and then stops	<ol style="list-style-type: none"> <li>1. replace logic board</li> </ol>
Print head "taps" platen once when power is turned on, and printer doesn't operate	<ol style="list-style-type: none"> <li>1. replace logic board</li> </ol>

SYMPTOM

CORRECTIVE ACTION

Printer does not operate  
and print head taps the  
platen once when power  
is turned off

1. replace logic board

Print head engages into  
platen and stays, printer  
does not operate further

1. replace logic board
2. check printhead after  
replacement of logic board  
is made

Carriage "jumps" once  
when power is turned on  
and then doesn't operate

1. replace logic board

Printer does not operate  
and platen roller reverse  
feeds when power is removed

1. replace logic board

Carriage jumps around then  
stops, when power is turned  
on

1. replace logic board





# **Scribe Printer Technical Procedures**

## **Section 5**

### **Preventive Maintenance**

#### **Contents:**

Manufacturer's Recommended Maintenance Schedule.....	5.3
Recommended Cleaning and Lubricating Materials.....	5.3
Routine Cleaning and Lubrication After Servicing.....	5.5
Yearly Maintenance.....	5.11



## MANUFACTURER'S RECOMMENDED MAINTENANCE SCHEDULE

User			
-- Once every year			
Dealer Service			
-- As required during preventive or corrective maintenance			
Dealer Service			
-- Once every year or 500,000 lines of print			
x	x	x	Clean and lubricate carriage shaft
	x	x	Clean platen
	x	x	Check drive belt tension
	x	x	Clean print head
	x	x	Clean paper-out sensor
	x	x	Clean front guide bar
			Clean and lubricate:
	x	x	a) carriage bearing stud
	x	x	b) carriage drive motor idler gear stud
	x	x	c) paper feed motor idler gear studs
	x	x	d) drive belt pulley shafts
		x	Lubricate platen sleeve bearings
		x	Lubricate tractor sleeve bearings

### RECOMMENDED CLEANING AND LUBRICATING MATERIALS

Cleaning: clean absorbent cloth or piece of gauze  
 small soft brush  
 cotton swabs  
 alcohol (isopropyl alcohol or equivalent)

Lubricating: Tellus oil #46 (Apple P/N 970-0006)



Figure 1

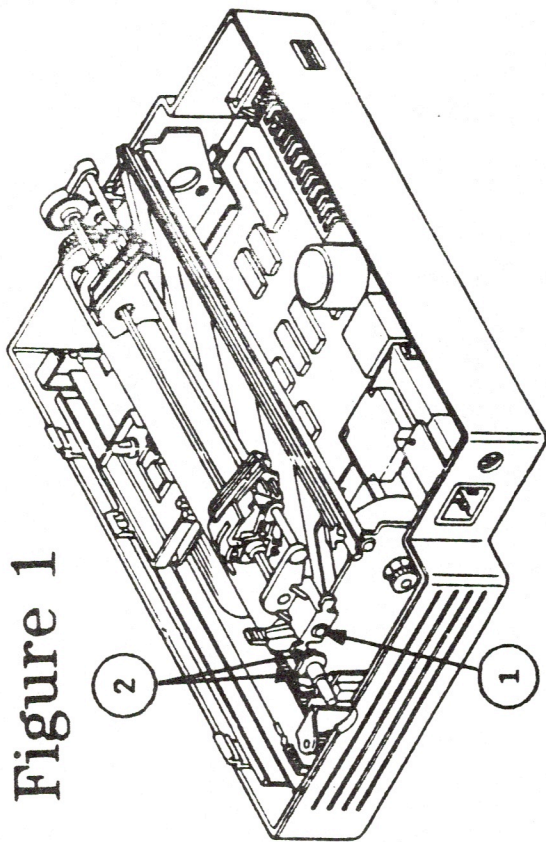


Figure 2

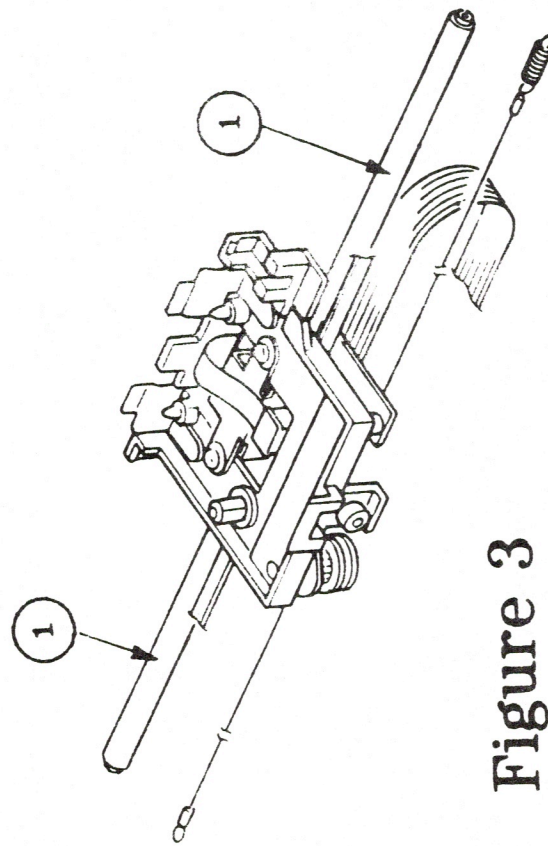
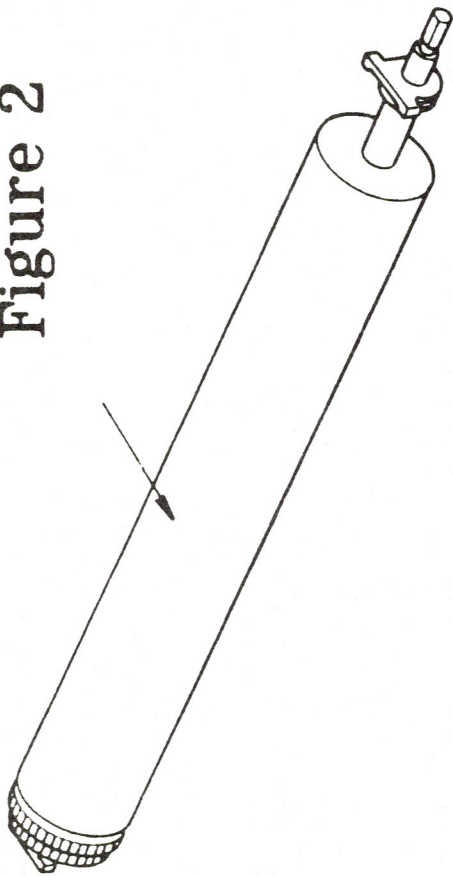


Figure 3

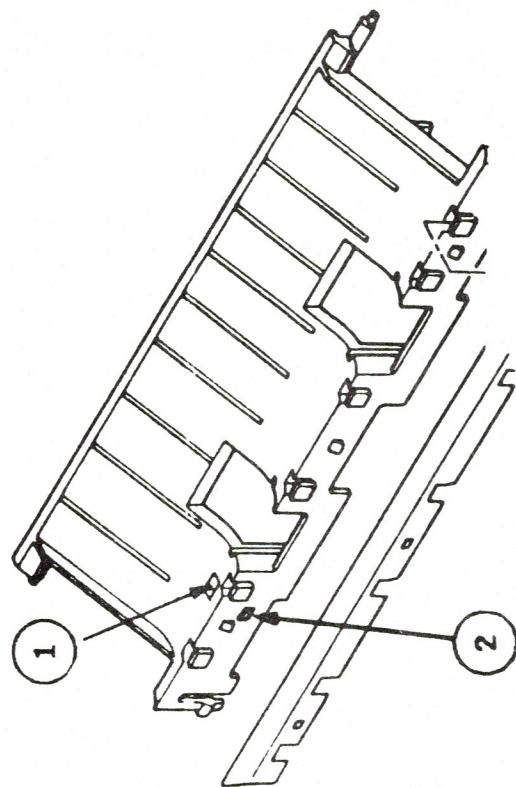


Figure 4

## ROUTINE CLEANING AND LUBRICATION AFTER SERVICING

**Tools Needed:**      Small flatblade screwdriver  
                         Medium Phillips screwdriver (magnetic)  
                         5.5 mm nutdriver

For optimum performance, Apple recommends that Scribe Printers be given a routine cleaning and lubrication, as described below, whenever they are serviced.

Before lubricating any part, thoroughly clean off old oil, dust and dirt by wiping the part with a clean absorbent cloth, slightly dampened with alcohol.

1. Make sure the power is off.
2. Remove the printer assembly from the case (see **Section 2, Take-Apart**).
3. Remove the tractor assembly and platen assembly as follows:
  - a) Remove the screws from the ends of the tractor assembly (see Figure 1, #1 - one screw on each side.)
  - b) Remove the tractor assembly (lift up and wiggle to disengage the ends from the printer assembly).
  - c) **Gently** pry out on the plastic tabs that hold the platen in place (two on each side - see Figure 1, #2) and lift the platen out of the printer.
4. **Remove dust and dirt from the platen surface** (Figure 2) with a cloth moistened with alcohol.
5. **Clean the carriage shaft** with a cloth moistened with alcohol (see Figure 3, #1).
6. **Lubricate the carriage shaft** by applying two drops of the recommended oil to each side of the shaft. Slide the carriage assembly side to side to spread the oil. Clean off any excess with a clean dry cloth.
7. **Clean the paper-out sensor** (Figure 4: for early models, see #1; for later models, see #2) with a soft brush (or a cotton swab moistened with alcohol).



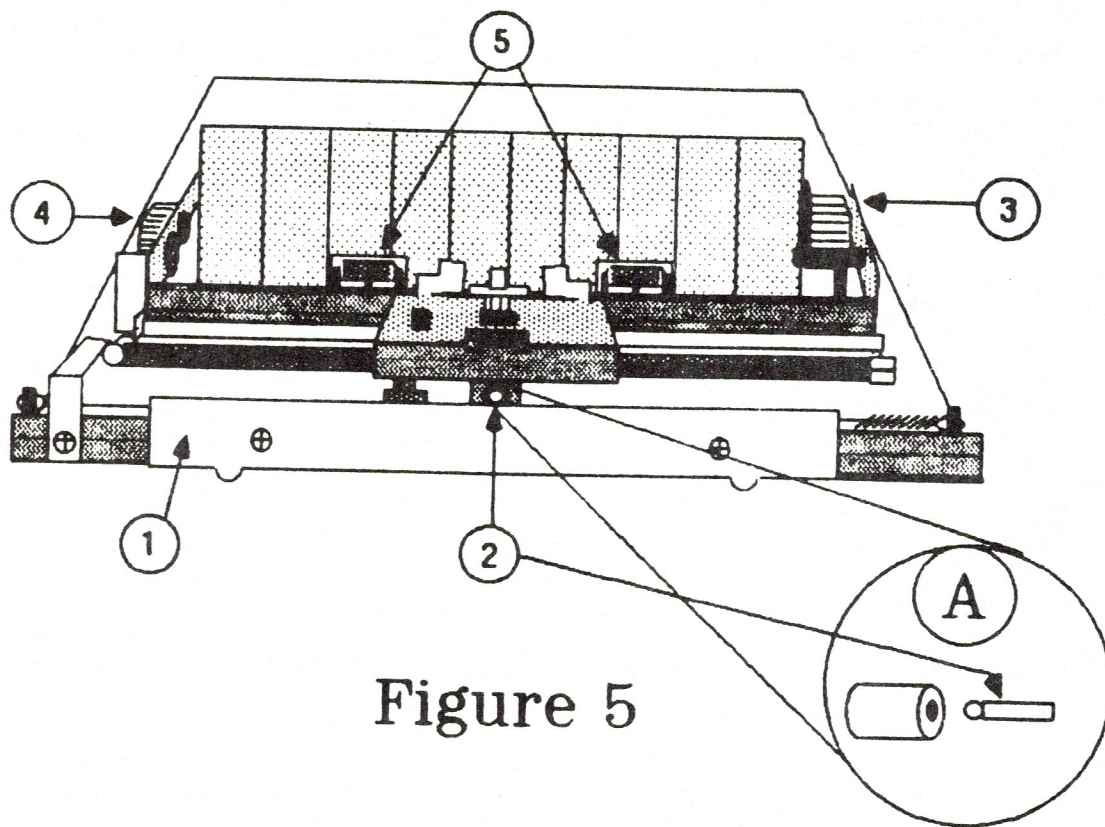


Figure 5

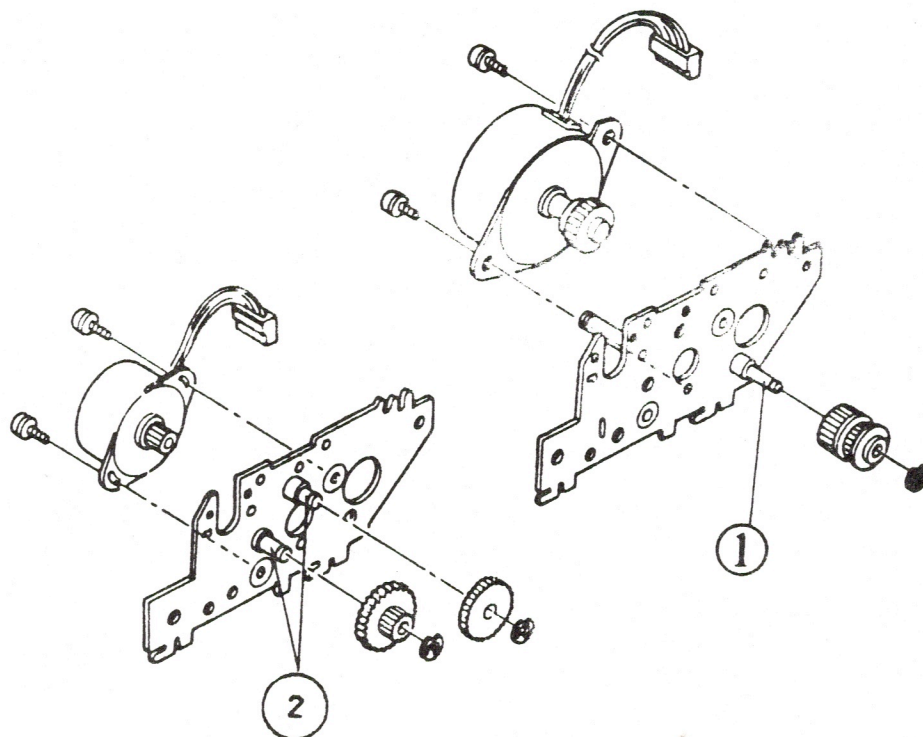


Figure 6



8. **Remove the print head and clean it** with a cotton swab moistened with alcohol. **CAUTION:** In reinstalling, be sure to reinstall the **rubber cap** over the connector.
9. **Clean the front guide bar** with a clean cloth moistened with alcohol. (See Figure 5, #1.)
10. **Clean and lubricate the carriage bearing stud** (Figure 5, #2 and detail A) as follows:
  - a) Pop the bearing off the stud with a small screwdriver.
  - b) Clean the stud; apply one drop of oil.
  - c) Replace the bearing on the stud.
11. **Clean and lubricate the idler gear stud on the carriage drive motor** (Figure 6, #1: for location see Figure 5, #3) as follows:
  - a) Loosen the drive belt (see **Section 3, Adjusting the Drive Belt Tension**) and slip it off the idler gear.
  - b) Remove the E-clip and pull the idler gear off the stud. **NOTE:** Pulling the gear off takes some effort.
  - c) Clean the stud; lubricate with one drop of oil.
  - d) Reinstall the gear and E-clip, making sure the outer lip is on the gear. (Do not reinstall the drive belt yet.)
12. **Lubricate the idler gear studs on the paper feed motor** (Figure 6, #2: for location see Figure 5, #4) as follows:

**To access the idler gears:**

- a) Move the carriage assembly all the way to the right.
- b) Remove the two feed rollers (Figure 5, #5) from the paper pan.
- c) Remove the two screws that hold the paper pan (one under each roller slot).
- d) Unplug the paper-out sensor cable from its connector on the logic board.
- e) Remove the paper pan from the printer assembly.

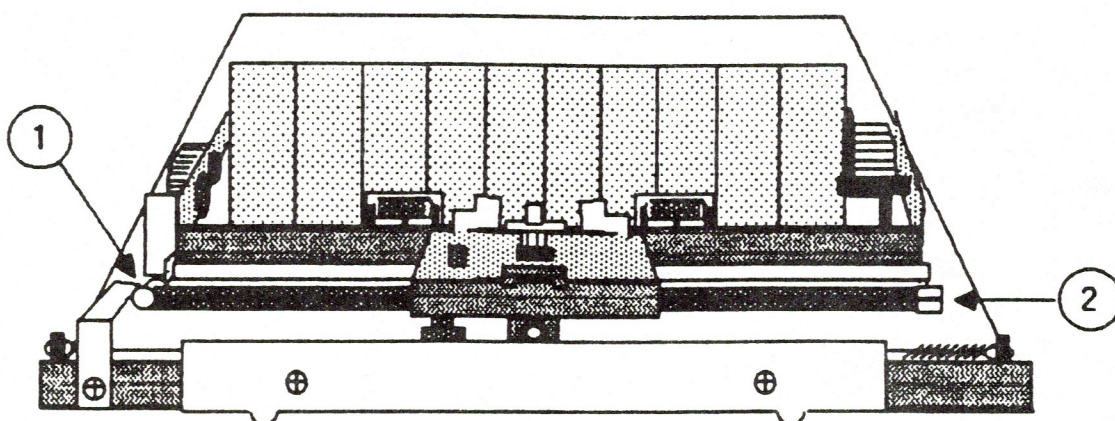


Figure 7

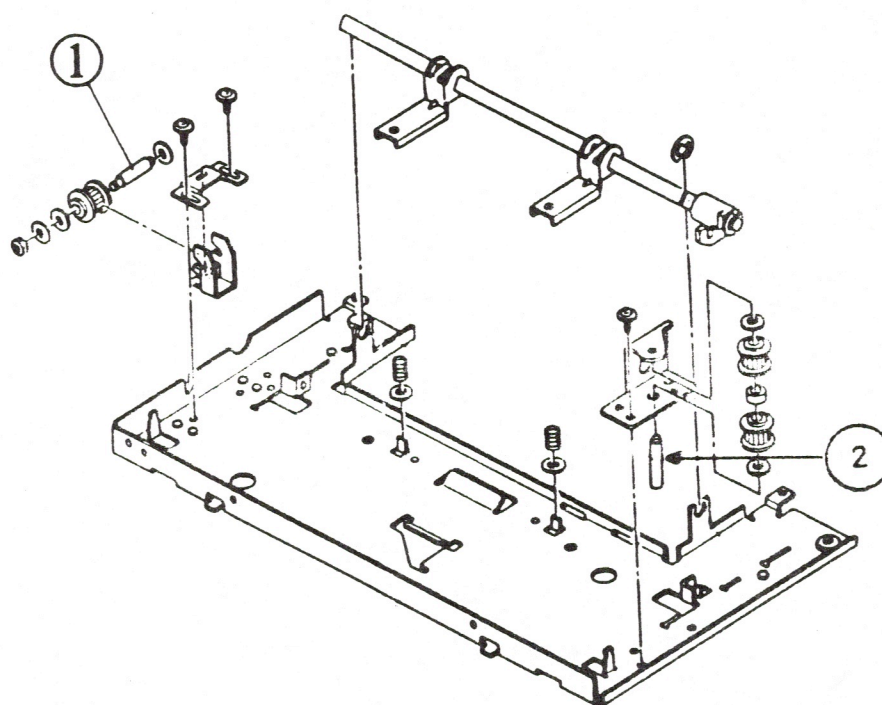


Figure 8



**To lubricate:**

- a) Remove the E-clip and washer from the upper bearing and pull the bearing off its stud.
- b) Clean the stud; apply one drop of oil; wipe off any excess.
- c) Put a small drop of oil behind the bearing on the lower stud (without removing the bearing).
- d) Replace the upper bearing on its stud; replace the washer and E-clip.
- e) Put the paper pan back into place, making sure to route the sensor cable **under** the square rod above the logic board, and reconnect the cable.
- f) Replace the two screws in the paper pan, making sure the copper grounding clip is in place under the left-hand screw.
- g) Reinstall the two feed rollers. (The smaller cylinders go to the front.)

**13. Clean and lubricate the left drive belt pulley shaft as follows:**

- a) Remove the pulley assembly from its slot (see Figure 7, #1; exploded view in Figure 8, #1).
- b) Being careful not to lose any washers, slide the shaft from the pulley assembly.
- c) Clean the shaft; apply one drop of oil.
- d) Reassemble the pulley and reinsert it in its slot.

**14. Clean and lubricate the right drive belt pulley shaft as follows:**

- a) Remove the two screws at the base of the right drive pulley assembly (Figure 7, #2; exploded view in Figure 8, #2), and remove the assembly from the printer.
- b) With a small pointed object, push down on the top of the shaft. Then grasp the bottom of the shaft and pull it out of the assembly. **CAUTION:** Leave the pulleys in the assembly: if you remove them, they will be difficult to reassemble.



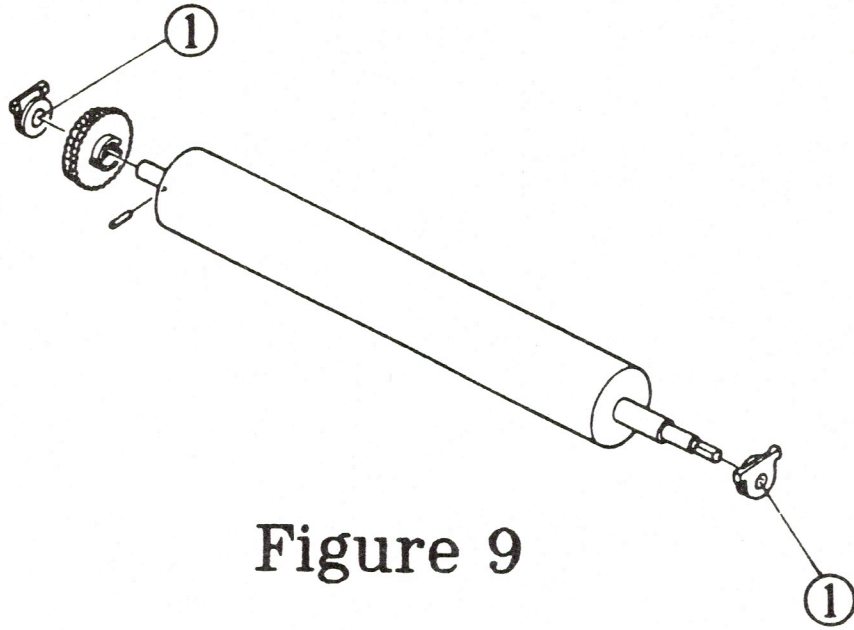


Figure 9

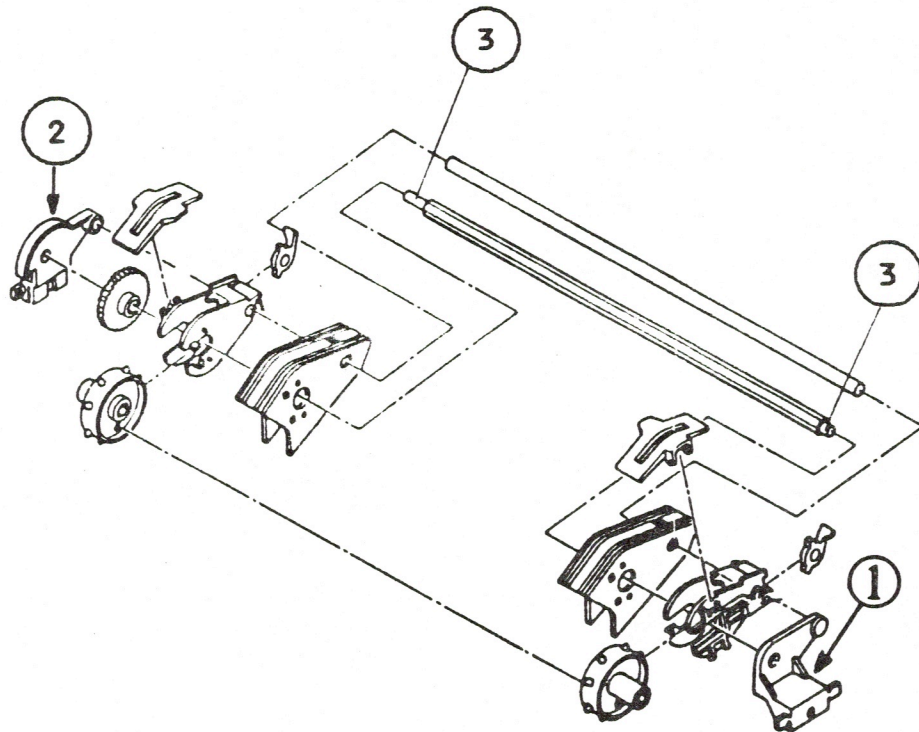


Figure 10

- c) Clean the shaft; then apply one drop of oil.
  - d) Put the shaft back through the assembly (the small end goes on top), and replace the assembly in the printer.
- 15. Reposition the drive belt and adjust the drive belt tension (see **Section 3, Adjustments**).
  - 16. Reinstall the platen assembly and tractor assembly (unless you are performing Yearly Maintenance: in that case, skip to **Yearly Maintenance**, below.)
  - 17. Replace the ribbon cartridge.
  - 18. Perform the Loopback Test to check printing performance. (See **Section 1, Basics**.)

#### **YEARLY MAINTENANCE**

Once every year or 500,000 lines of print, the following steps should be performed (in addition to the Routine Cleaning and Lubrication above).

- 1. **Clean and lubricate the platen sleeve bearings** as follows:
  - a) Remove the bearings from the platen assembly (see Figure 9, #1).
  - b) Clean the platen shaft and the bearings with a clean cloth moistened with alcohol.
  - c) Apply one drop of lubricating oil to each end of the platen shaft. Wipe off the excess.
  - d) Reinstall the bearings.
- 2. **Clean and lubricate the tractor sleeve bearings** as follows:
  - a) Pull the right side panel off the tractor assembly (see Figure 10, #1).
  - b) Pull the left side panel off the end of the tractor sleeve (Figure 10, #2). (You do not have to remove the panel completely: just expose the end of the tractor sleeve.)

- c) Clean the ends of the tractor shaft (Figure 10, #3) with a clean cloth.
  - d) Put one drop of lubricating oil on each end.
  - e) Reinstall the side panels.
3. Reassemble the printer and perform the loopback test to check operation and print quality.

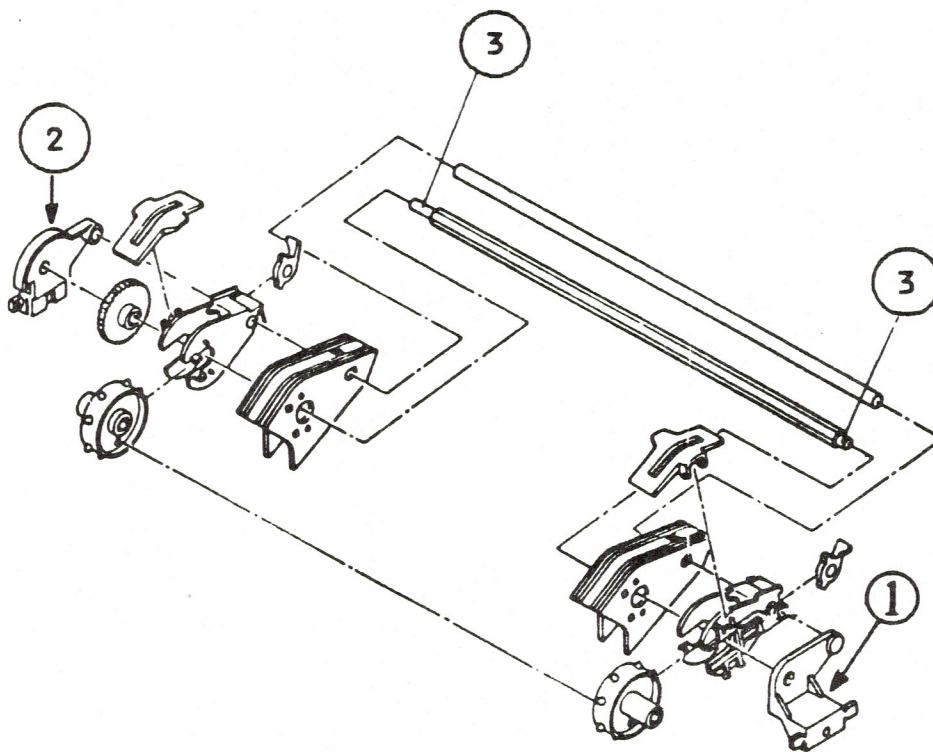


Figure 10



## Scribe Printer Technical Procedures

### Section 6

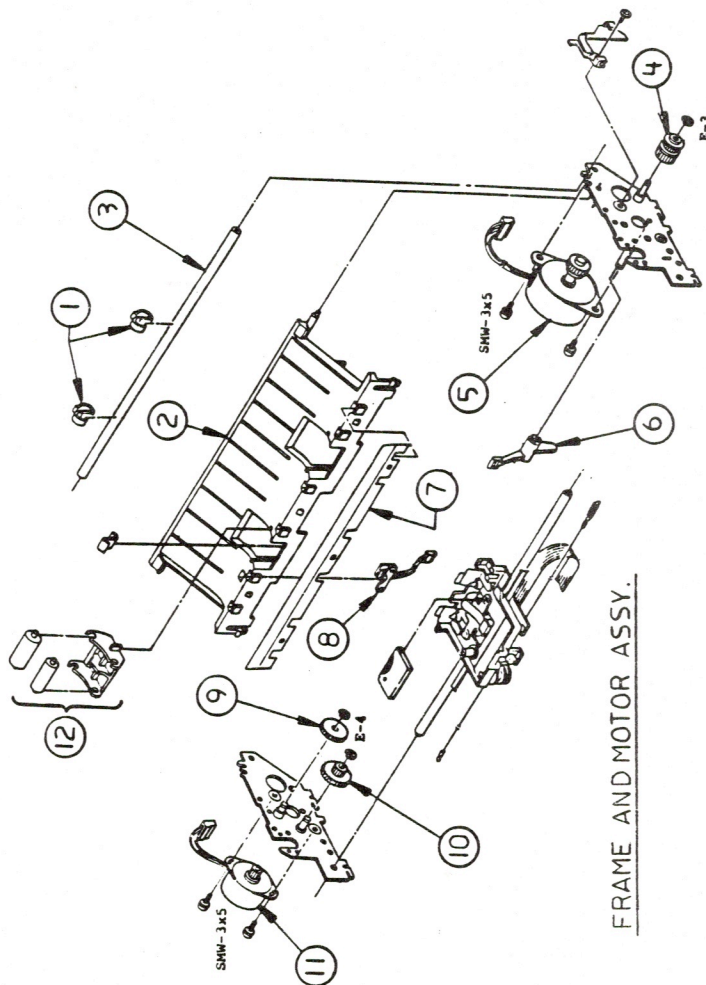
#### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Scribe Printer, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

Frame and Motor Assembly.....	6.1
Base Assembly.....	6.3
Tractor & Platen Assembly.....	6.5
Carriage Assembly.....	6.7
Covers.....	6.9
Power Supply & Main Logic Board.....	6.11
Cables.....	6.13

NOTE: UNLESS OTHERWISE SPECIFIED



FRAME AND MOTOR ASSY.

Figure 1

REV ZONE	ECO #	REVISION	APPD	DATE
A	5666	INITIAL RELEASE		

METRIC DIMENSIONS ARE IN MILLIMETERS TOLERANCES XX . . . ANGLES . . . FINISH . . . MATERIAL . . . DRWG APPR. 3/85 ENG APPR. 3/85 RELEASE DESIGNER		<b>apple computer inc.</b> NOTICE OF PROPRIETARY PROPERTY THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING: (i) TO MAINTAIN THIS DOCUMENT IN CONFIDENCE (ii) NOT TO REPRODUCE OR COPY IT (iii) NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART	
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		SMT <b>1/7</b>	

SCRIBE PRINTER, FRAME & MOTOR ASSEMBLY (Figure 1)

Item	Part No.	Description
1	970-0943	Clip, Wire Harness
2	970-0949	Pan, Paper Feed
3	970-0911	Shaft, Frame Support
4	970-0935	Pulley, Carriage Drive
5	970-0962	Motor, Carriage Drive
6	970-0929	Lever, Feed Roller Release
7	970-0916	Plate, Paper Deflector
8	970-0971	Sensor Assembly, Out of Paper Detect
9	970-0927	Gear, Idler
10	970-0925	Gear, Idler/Platen Drive
11	970-0963	Motor, Paper Feed
12	970-0956	Feed Roller Assembly





**SCRIBE PRINTER, BASE ASSEMBLY (Figure 2)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	970-0969	Shaft Assembly, Feed Roller Release
2	970-0944	Retainer, Ribbon Cable
3	970-0899	Spring, Feed Roller
4	970-0928	Collar, Carriage Drive Pulley
5	970-0903	Washer, Carriage Drive Pulley
6	970-0907	Shaft, Pulley Mounting
7	970-0966	Switch, Home Position
8	423-2001	Screw, Hex Hd, 3.0 x .50 x 12
9	970-0915	Plate, Carriage Drive Pulley Mounting
10	970-0908	Shaft, Carriage Drive Pulley
11	970-0936	Pulley, Carriage Drive, Inverter
12	970-0961	Resistor Assembly, 5 Watt Ceramic





**SCRIBE PRINTER, TRACTOR & PLATEN ASSEMBLY (Figure 3)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	970-0910	Shaft, Tractor Support
2	970-0913	Shaft, Tractor Assembly Drive
3	970-0960	Tractor Assembly, R.H.
4	970-0924	Frame, R.H. Tractor Assy
5	970-0906	Platen Roller, Rubber
6	970-0926	Gear, Platen Drive
7	970-0930	Bearing, Platen Holder
8	970-0980	Gear, Tractor Drive
9	970-0923	Frame, L.H. Tractor Assembly
10	970-0959	Tractor Assembly, L.H.
11	970-0947	Guide, Paper/Tractor

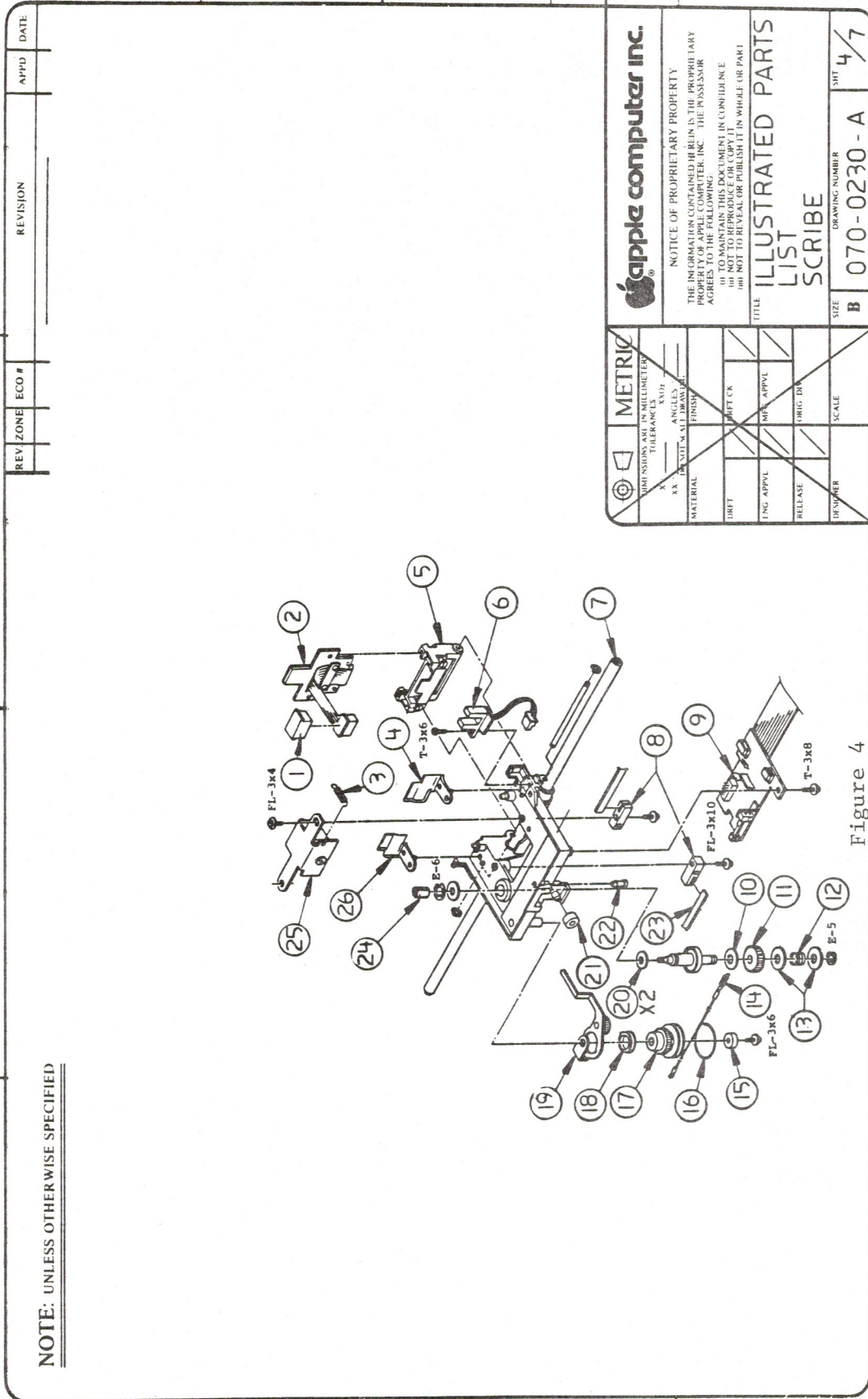


Figure 4

NOTE: UNLESS OTHERWISE SPECIFIED

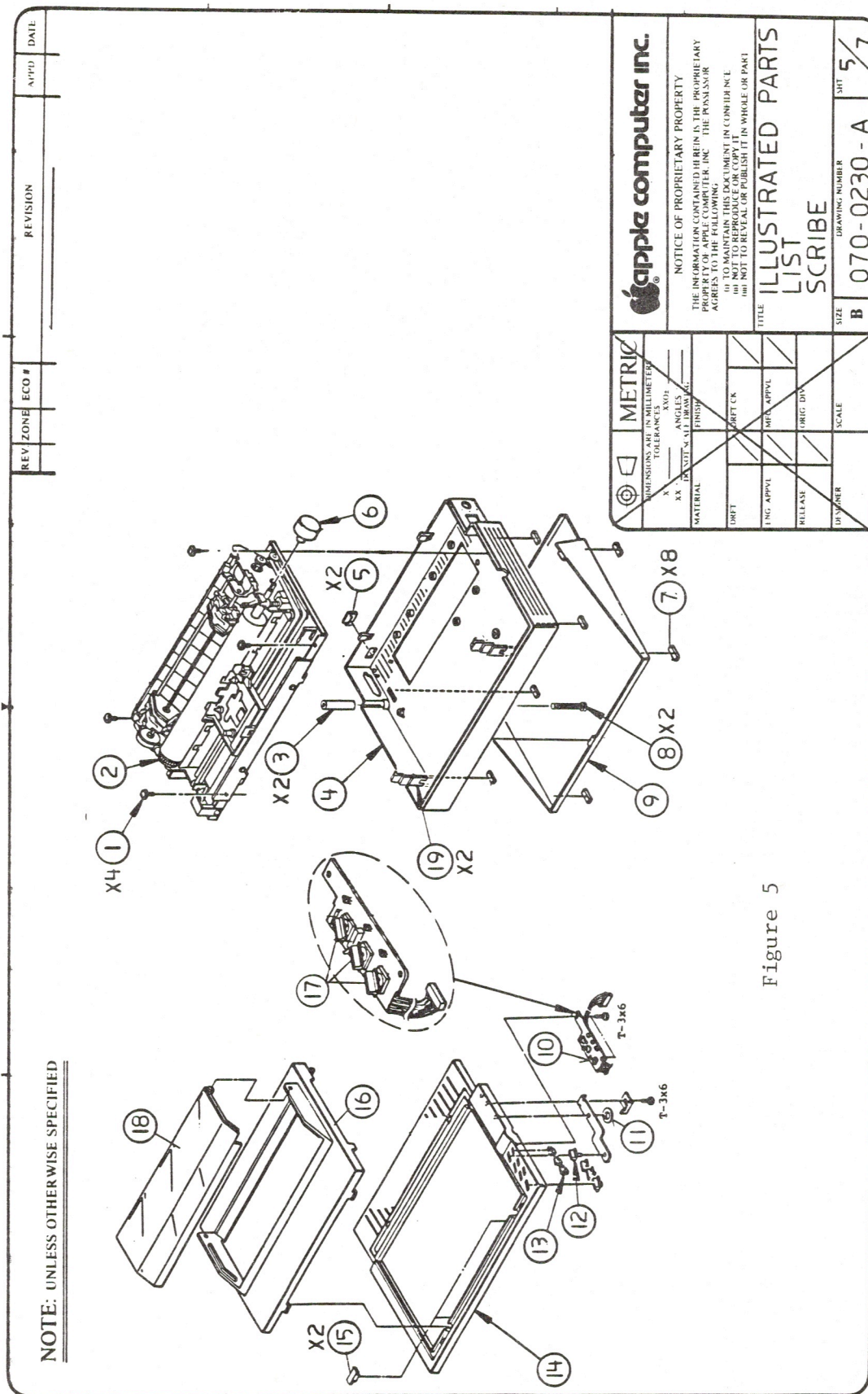
REV ZONE ECO #		REVISION		APPD	DATE

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SIZE <b>B</b>		DRAWING NUMBER <b>070-0230-A</b>	
SHEET <b>4/7</b>			

# SCRIBE PRINTER, CARRIAGE ASSEMBLY (Figure 4)

Item	Part No.	Description
	970-0975	Carriage Assembly, Complete, w/o Printhead
1	970-0955	Cap, Print Head, Rubber
2	076-0090	Print Head Assembly
3	970-0972	Spring, Solenoid Assembly
4	970-0922	Guide, Paper Holder, R.H.
5	970-0957	Mounting Assembly, Print Head
6	970-0965	Sensor Assembly, Out of Ribbon Detect
7	970-0909	Shaft Carriage
8	970-0918	Clamp, Carriage Drive Belt
9	970-0970	PCB, Carriage Assembly w/Cable
10	970-0945	Washer, Ribbon Feed Friction
11	970-0919	Gear, Ribbon Take-up
12	970-0900	Spring, Ribbon, Clutch/Take-up
13	970-0914	Washer, Ribbon Take-up
14	076-0097	Spring Assembly, Ribbon Cable
15	970-0912	Collar, Ribbon Clutch
16	076-0096	Cable Assembly, Ribbon Feed
17	970-0920	Gear, Ribbon Clutch Drive
18	970-0917	Gear, Metal Ribbon Clutch Feed
19	970-0958	Gear Assembly, Ribbon Feed Correction
20	970-0940	Washer, Ribbon Feed
21	970-0937	Bearing, Carriage Assembly
22	970-0921	Actuator, Ribbon Box Detect
23	076-0095	Belt Assembly, Carriage Drive
24	970-0938	Capstain, Ribbon Drive
25	970-0964	Solenoid Assembly, Print Head
26	970-0939	Guide, Paper Holder, L.H.





# SCRIBE PRINTER, COVERS (Figure 5)

Item	Part No.	Description
1	076-0089	Screw Assembly, Misc.
2	661-75218	Mechanism Assembly w/o Printhead
3	970-0978	Spacer, Cover
4	970-0973	Cover Assembly, Bottom
5	970-0948	Plug, DIP Switch
6	970-0934	Knob, Platen
7	076-0094	Feet Assembly, Rubber
8	076-0089	Screw Assembly, Misc
9	970-0967	Tray Assembly, Paper
10	076-0093	Control Panel Assembly
11	970-0904	Nut, Push
12	970-0933	Button, Power Switch
13	970-0932	Lens, Control Panel, LED
14	970-0968	Cover Assembly, Top
15	970-0946	Plug, Top Cover, Snap
16	970-0951	Cover, Printer
17	970-0931	Button, Control Panel
18	970-0952	Lid, Printer Cover
19	970-0974	Clip, Bottom/Top Cover



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NOTE: UNLESS OTHERWISE SPECIFIED

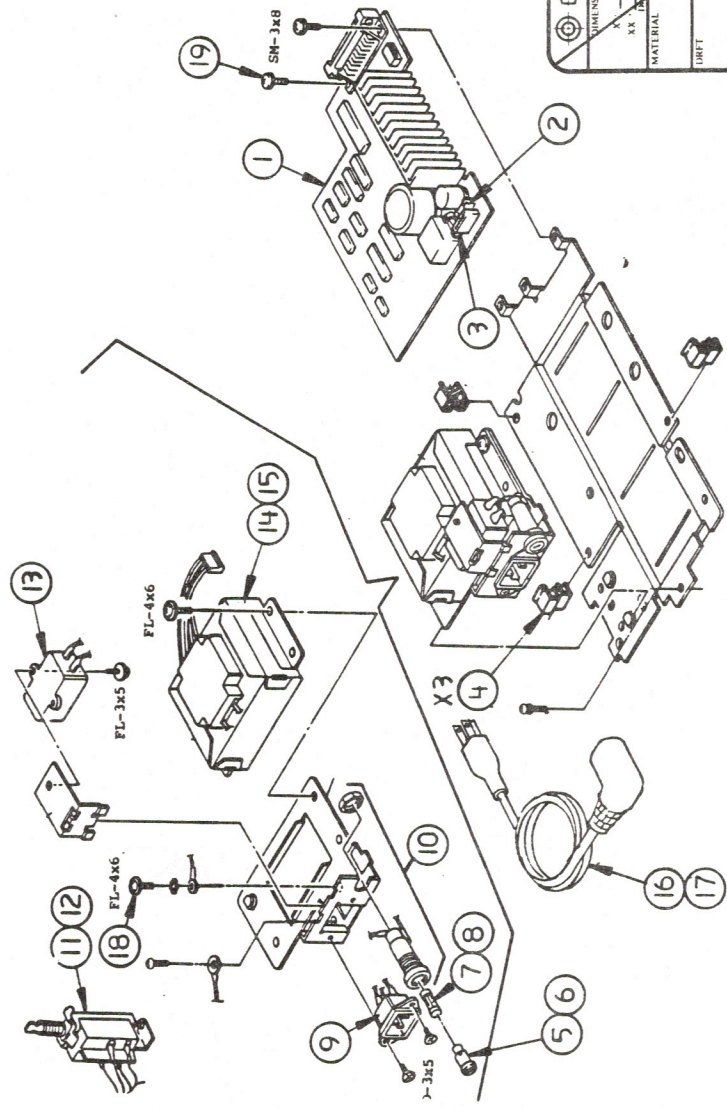


Figure 6

<b>apple computer inc.</b>		NOTICE OF PROPRIETARY PROPERTY THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING: (i) TO MAINTAIN THIS DOCUMENT IN CONFIDENCE (ii) NOT TO REPRODUCE OR COPY IT (iii) NOT TO REVEAL OR PUBLISH IT IN WHOLE OR PART	
		TITLE <b>ILLUSTRATED PARTS LIST</b> <b>SCRIBE</b>	
METRIC DIMENSIONS ARE IN MILLIMETERS TOLERANCES ARE: XX DECIMALS ALL DIMENSIONS ANGLES FINISH MATERIAL DRAFT ENG. APPVL RELEASE DIS. NUMBER	SIZE <b>B</b>	DRAWING NUMBER <b>070-0230-A</b>	SMT <b>6/7</b>



# SCRIBE PRINTER - POWER SUPPLY & MAIN LOGIC BOARD (FIGURE 6)

Item	Part No.	Description
1	661-75217	Main Logic PCB
2	740-0400	Fuse, Medium Time Lag, 2A, 125V
3	740-0401	Fuse, Medium Time Lag, 4A, 125V
4	970-0942	Clip, PCB Guide
5	970-0712	Cap, Fuse, 110V
6	970-0713	Cap, Fuse, 220V
7	740-0101	Fuse, 2A, 250V
8	740-0100	Fuse, 1A, 250V
9	970-0902	Holder, AC Fuse
10	970-0983	Receptacle, AC Input
11	076-0091	Power Switch Assembly, 110V
12	076-0092	Power Switch Assembly, 220V
13	970-0901	Noise Filter, AC Line
14	970-0953	Transformer, AC Line, 115V
15	970-0954	Transformer, AC Line, 220V
16	970-0635	Power Cord, 110V
17	970-0710	Power Cord, 220V
18	076-0089	Screw Assembly, Misc.
19	076-0089	Screw Assembly, Misc.

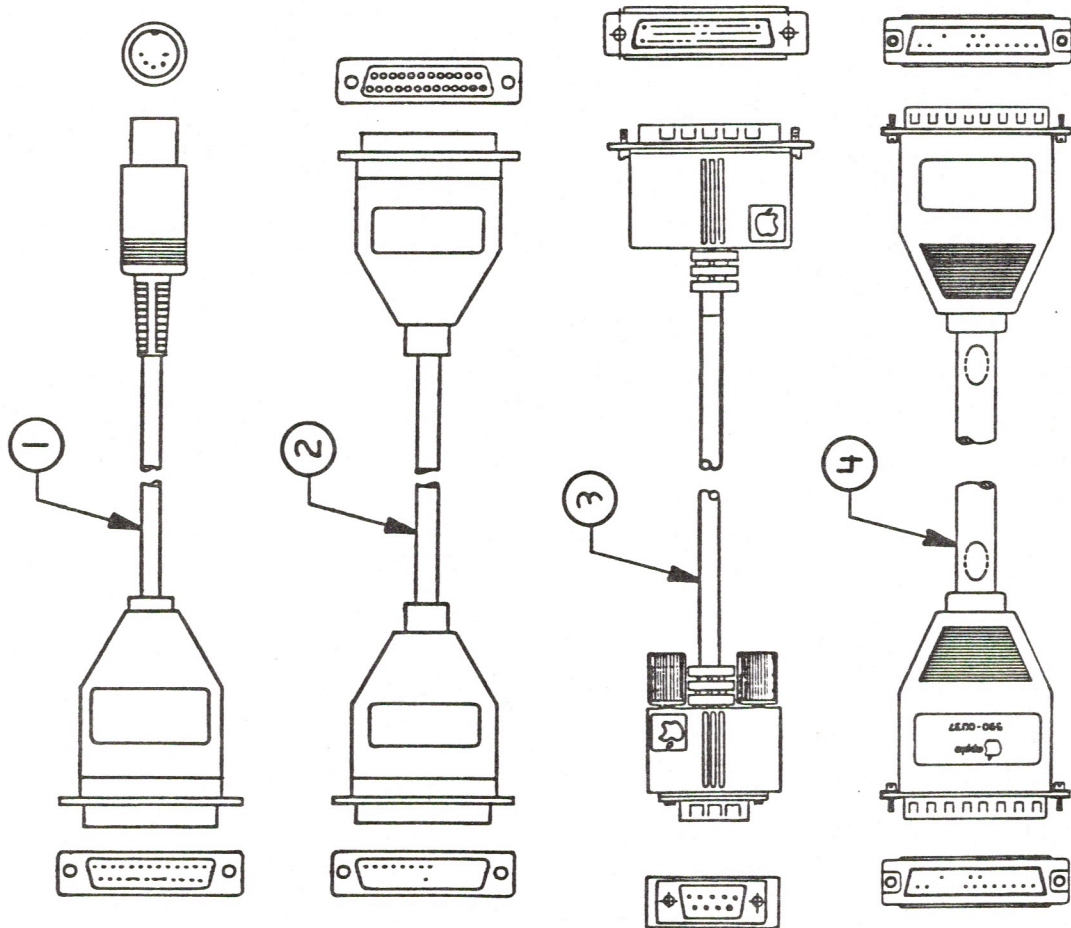


FIGURE 7

SCRIBE PRINTER - CABLES (Figure 7)

Item	Part No.	Description
1	590-0191	Cable, Printer Interface Allc
2	590-0166	Modem Eliminator Cable Assembly
3	590-0169	Macintosh Printer Cable
4	590-0037	Serial Interface Cable



**End of Scribe Printer  
Section Start of Apple  
Color Plotter Section**

# APPLE COLOR PLOTTER TECHNICAL PROCEDURES

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# Apple Color Plotter Technical Procedures

## Section 1

### Troubleshooting

#### Contents:

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Troubleshooting Flowchart.....	1.4
Interface Test Flowchart.....	1.6
Alignment Procedure.....	1.7
Plotter Test Example (from plotter test diskette).....	1.8
Plotter Self-test.....	1.9

For these procedures you will need:

- Plotter test diskette
- Medium phillips screwdriver
- Medium flatblade screwdriver
- Allen wrench
- 5.5 mm nutdriver
- Tape



## INTRODUCTION

The troubleshooting flowchart is largely self explanatory. Refer to the take-apart section of these procedures if you need instruction on how to remove, replace, and adjust modules.

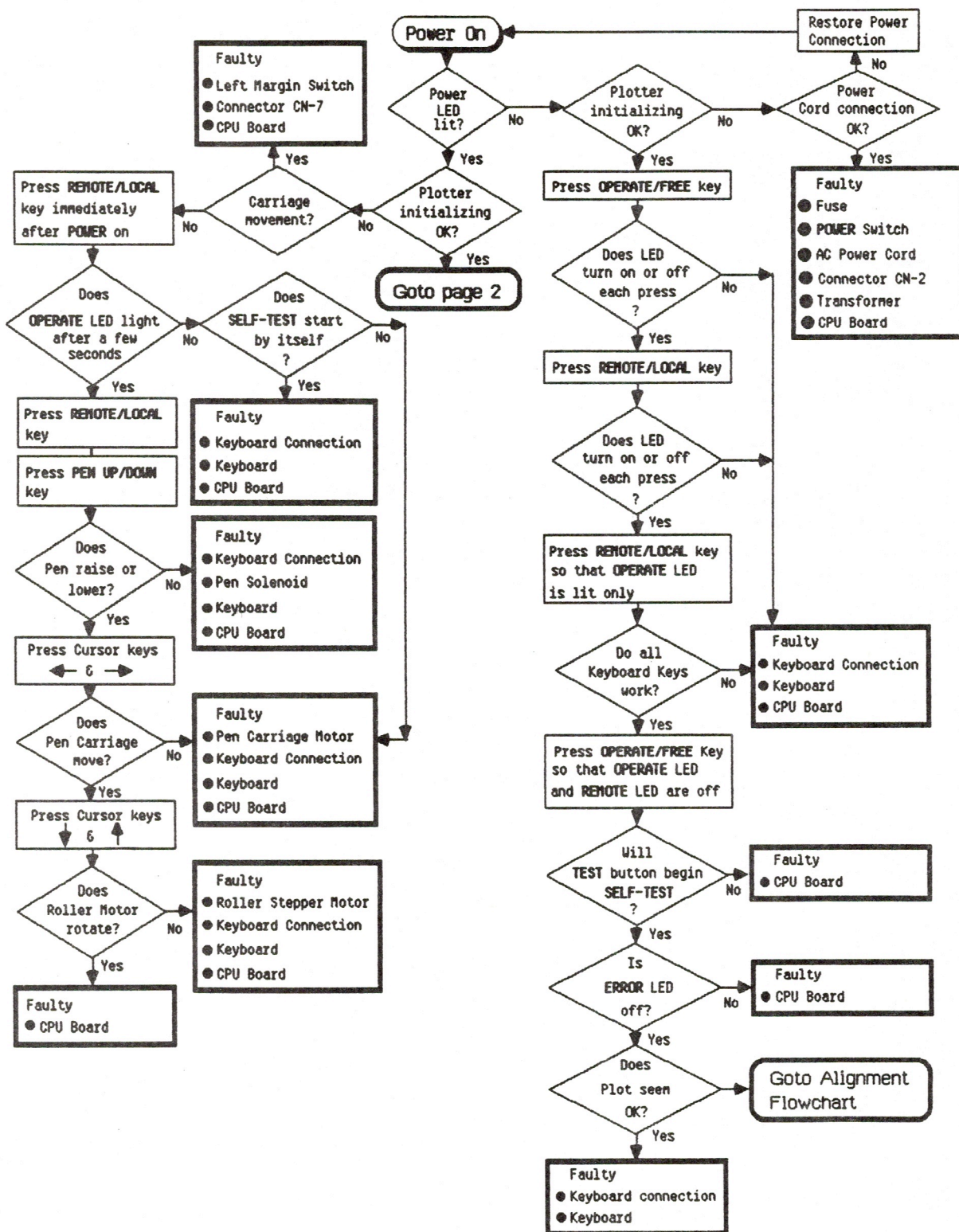
A few terms that are used in the flowchart may need clarification.

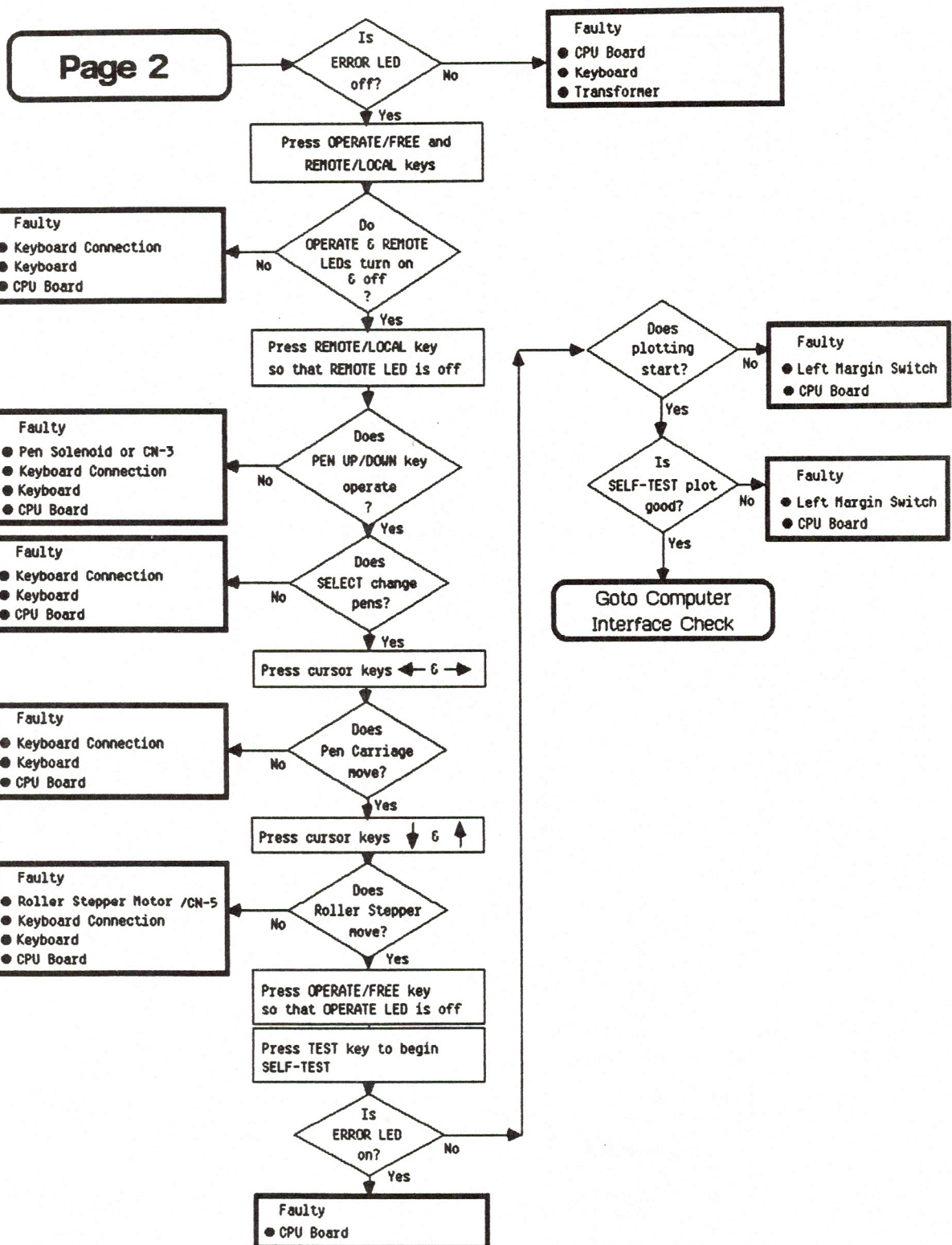
**Plotter Initialization** - After powering-up the plotter, the pen carriage travels to the left and rotates several times until pen number 1 is pointing down.

**Self-Test** - After power-up and initialization, press the test button on the plotter keyboard. The plotter is reinitialized, and then draws a self-test pattern.

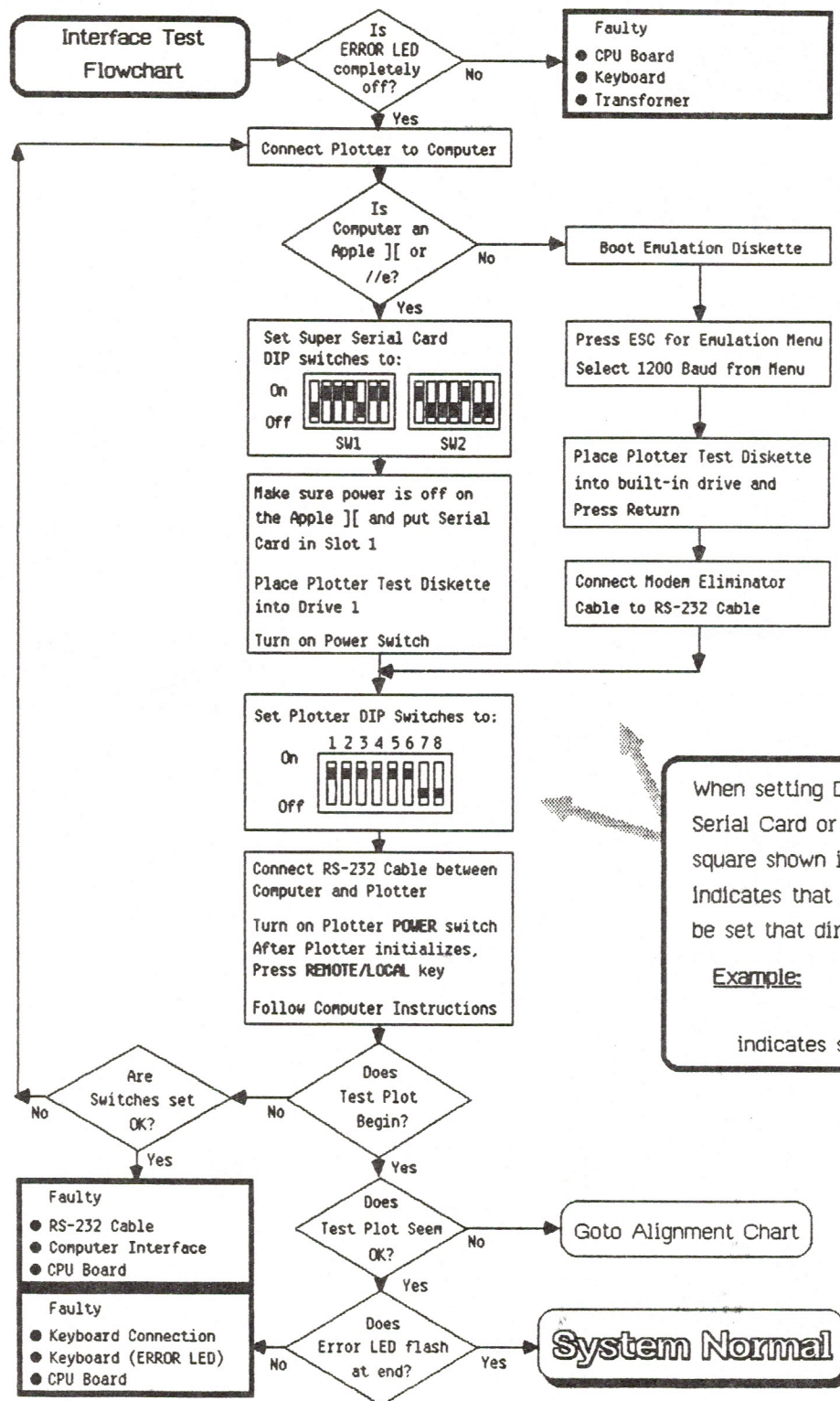
Names of parts and their location can be found in the **Exploded Diagram and Parts List (Section 4, of these procedures)**.



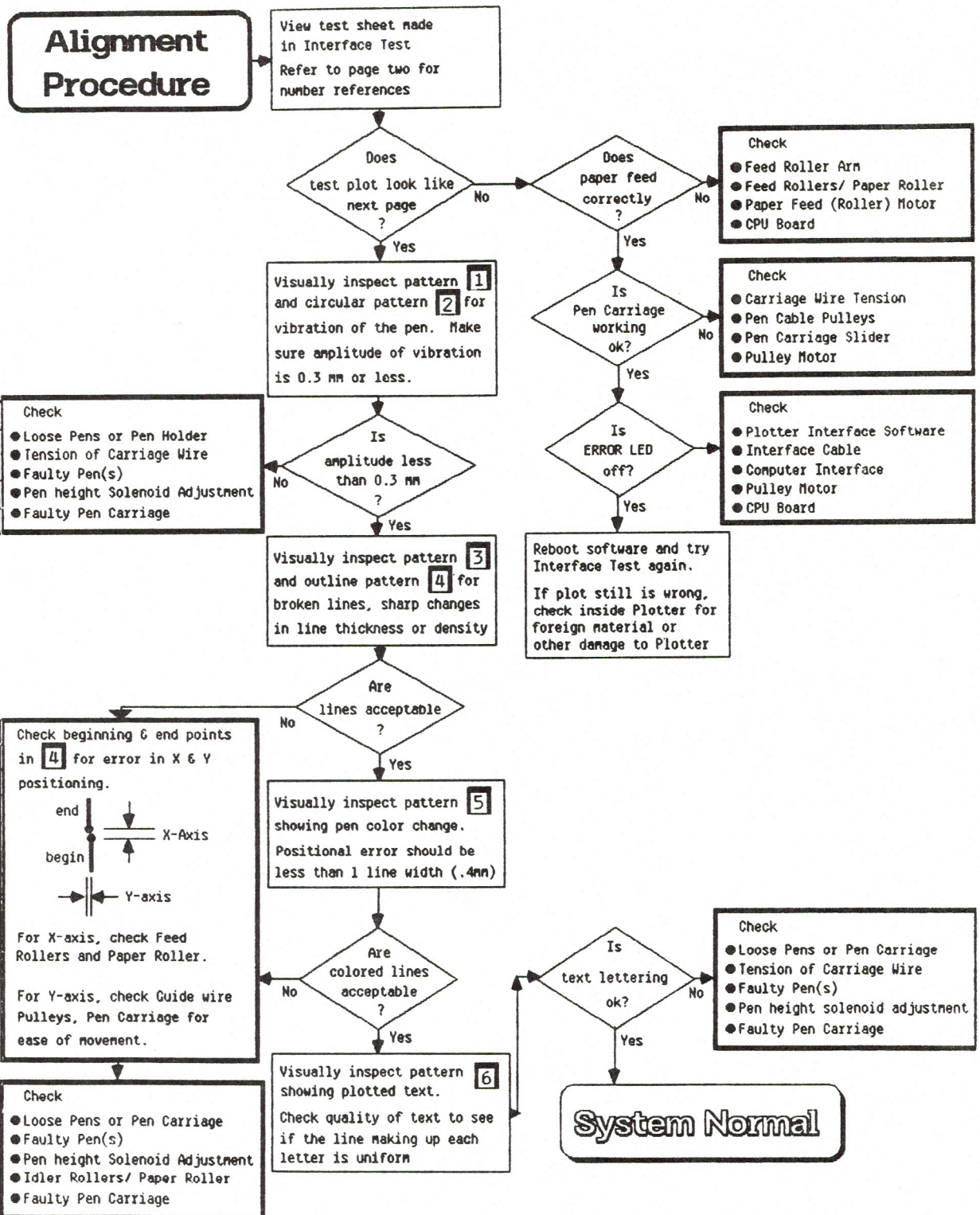






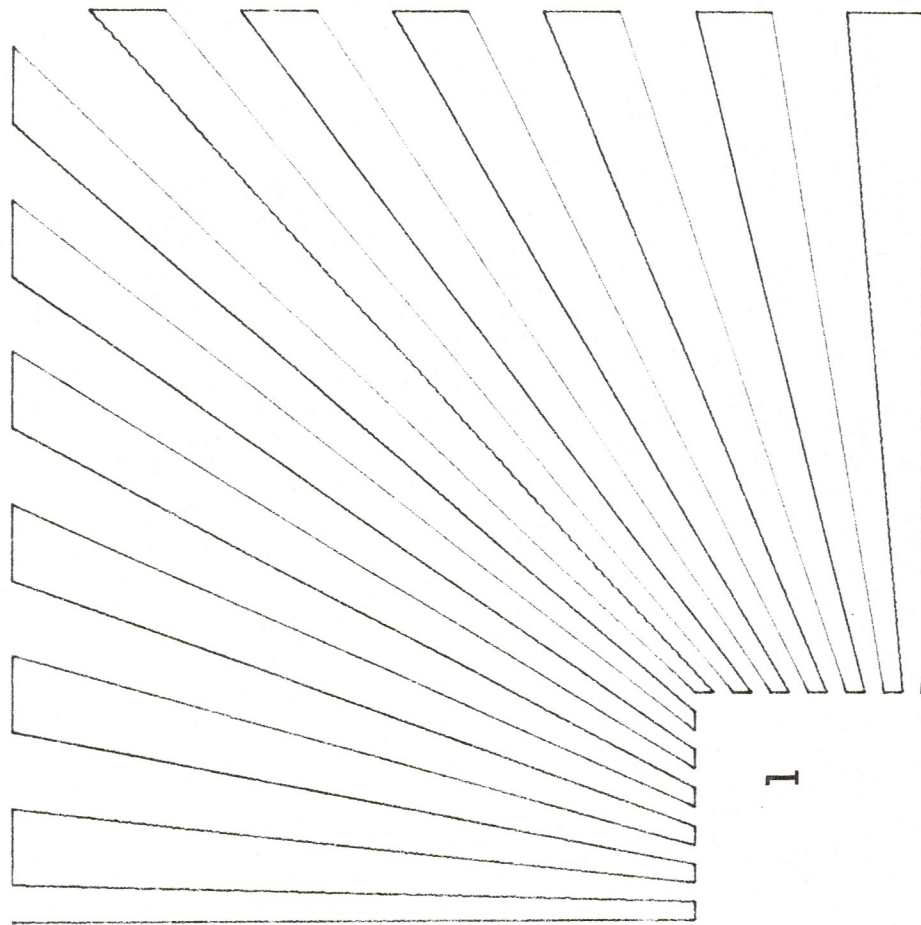
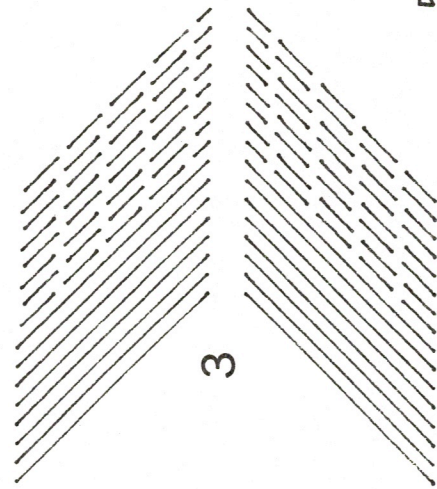
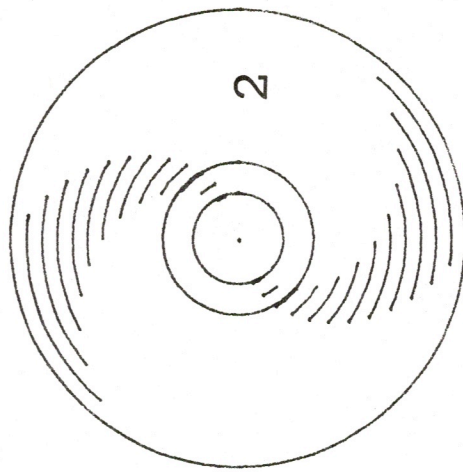






# PLOTTER TEST<sup>6</sup>

ABCDEFGHIJKLMNOPQRSTUVWXYZ





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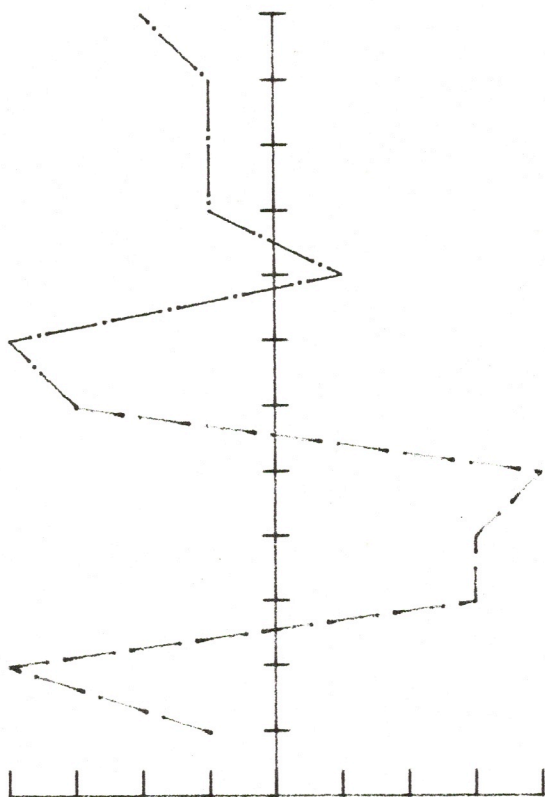
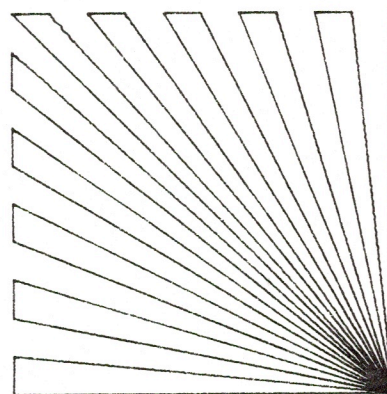
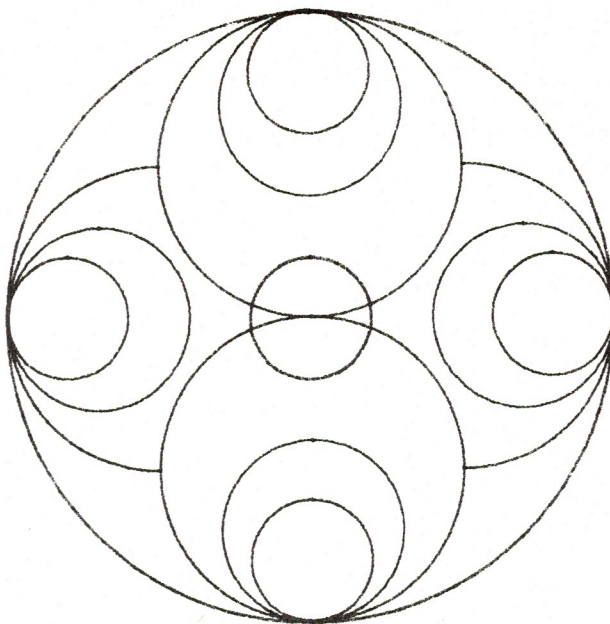
Apple

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Apple Color Plotter Test







# Apple Color Plotter

## Section 2

### Setup and Configuration

#### Contents:

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Hooking up the Plotter.....	2.2
Setting the DIP Switches.....	2.3
Load Pens.....	2.5
Load Paper.....	2.5
Testing Computer/Plotter Communication.....	2.6

For these procedures you will need:

- Apple Color Plotter
- Apple computer with monitor and power cable
  - If you are attaching an Apple IIe, II+, or II you will need a serial port card
  - If you are attaching an Apple /// you will need an Apple II Emulation diskette
- Apple Color Plotter test diskette
- Plotter power cable
- RS232 cable
- Modem eliminator cable
- Small flatblade screwdriver

## INTRODUCTION

Refer to Section 4, Exploded Diagram and Parts List, if you need assistance locating the parts referred to below.

There are a few things you must remember to do when you are setting up the plotter for a customer.

1. Use the modem eliminator cable as well as the RS232 cable to connect the plotter to an Apple.
2. Verify the setting of the plotter DIP switches. (Although the User's Guide says the plotter will be shipped with the switches set correctly, it is possible that they will not be correct.)
3. Boot the plotter test diskette to see that the computer communicates successfully with the plotter.

Below you will find brief instructions outlining these procedures.

**Beware:** The Apple /// and the Apple II computers have slightly different procedures. Be sure to read the notes (in each section below) which describe these differences.

## HOOKING UP THE PLOTTER

1. Connect the "female" end of the modem eliminator cable (the shorter of the two cables you received with the color plotter) to one of the ends of the RS232 cable.
2. Tighten the screws that come with the cables to secure the connection.
3. Connect one end (it does not matter which) of the cable you just "made" to the plotter. Secure the connection by tightening the mounting screws.

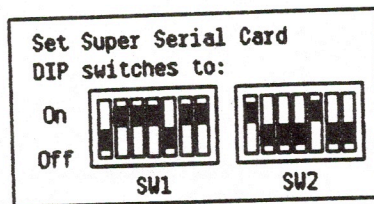


4. Connect the other end of the cable to the computer.

**Note:** Apple /// - Attach it to port C.

**Note:** Apple II, II+, IIe - Attach it to a super-serial card with DIP switches set as seen below (See Figure 1).


## FIGURE 1



When setting DIP switches on Serial Card or Plotter, the dark square shown in each diagram indicates that the switch is to be set that direction.

**Example:**

On  
Off



indicates switches are *ON*

4. Connect the power cable to the plotter.
5. Plug the power cable into an AC outlet.

### SETTING THE DIP SWITCHES

The plotter is capable of communicating with a large number of computers. Within the RS232 standard there are variations of signal format and transmission speed, to suit different machine-to-machine communication requirements. The interface setting switches allow you to define the RS232 input.

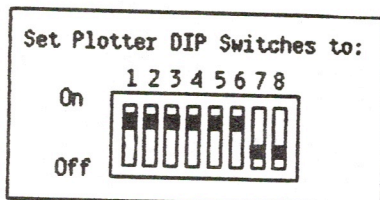
The interface setting switches are on the back panel of the plotter.

Apple Computers communicate with the plotter via an RS232 interface that is configured as follows:

- 7 bits
- No parity selected
- 2 stop bits
- 1200 baud

Generally the settings for the plotter, when communicating with an Apple, should be as shown in Figure 2, below.

## FIGURE 2



When setting DIP switches on Serial Card or Plotter, the dark square shown in each diagram indicates that the switch is to be set that direction.

Example:



indicates switches are *ON*

For computers which do not follow this particular RS232 interface requirement, look at the table below. (See Figure 3.)

## FIGURE 3

### Plotter Interface DIP Switch Settings

1	2	3	4	5	6	7	8	
					OFF	OFF	OFF	75 BAUD
					OFF	OFF	ON	150 BAUD
					OFF	ON	OFF	300 BAUD
					OFF	ON	ON	600 BAUD
					ON	OFF	OFF	1200 BAUD
					ON	OFF	ON	2400 BAUD
					ON	ON	OFF	4800 BAUD
					ON	ON	ON	9600 BAUD
			OFF	OFF	.....			2 STOP BITS
			ON	OFF	.....			1.5 STOP BITS
			OFF	ON	.....			1 STOP BIT
			ON	ON	.....			INVALID
		OFF	.....					EVEN PARITY
		ON	.....					ODD PARITY
	OFF	.....						PARITY
	ON	.....						NO PARITY
OFF	.....							8 BITS
ON	.....							7 BITS



## LOAD PENS

Please note: If these instructions are not sufficient, a more detailed explanation can be found in the "Pens and Paper" chapter in the User's Guide.

1. Remove the pen holder from the pen carriage by pulling it towards you by the light colored plastic.
2. The pen holder has the numbers 1 through 4 on the front. Load the holder with the following pen/number combinations: black/1; red/2; green/3; blue/4.
3. Install the holder in the pen carriage. (Slide the pen holder onto the hub of the (black) carriage head until it snaps into place.)

**NOTE:** The holder will only fit one way.

## LOAD PAPER

Please note: If these instructions are not sufficient, more detailed explanations can be found in the "Pens and Paper" chapter in the User's Guide.

### Set paper width

1. Push pen carriage to the left.
2. Pull the light colored arm of the right feed roller horizontally toward you and slide the feed roller mechanism sideways to the right as far as it will go.
3. Slide a piece of 8 1/2 by 11 inch paper lengthwise on the front deck of the plotter in the position to be fed in, with its left edge about 6 mm (1/4") from the left wall of the plotter.
4. Pull the light colored arm of the right feed roller horizontally toward you and slide the feed roller mechanism sideways to the left until it is well over the right edge of the paper. The paper should not run into the arm itself.



5. Release the arm, then move the arm and feed roller to the right a short distance until it clicks into a notch.

**Note:** The feed roller will not drop down enough to grip the paper until it clicks into a notch.

#### **Insert paper**

6. Slide a sheet of paper under the metal tabs until it will go no further. Make the paper align with the line at the left of the paper table, marked "paper side."
7. Depress the paper feed knob on the right of the plotter, and turn it clockwise. You may have to push the paper a bit before it catches.

Paper is properly inserted when the top edge reaches the marks half way up the paper table.

If the paper is not properly aligned (straight), remove it and try again.

#### **TESTING COMPUTER/PLOTTER COMMUNICATION**

##### For the Apple ///

1. Turn on the plotter.
2. Press LOCAL on the plotter keyboard.
3. Boot the Apple II Emulation diskette.
4. Insert plotter test diskette.
5. Press <RETURN>. (Continue at Testing the Plotter)

##### For the Apple II, II+, and IIe

1. Boot the plotter test diskette in disk drive 1.

## Testing the plotter

Just follow the instructions on the screen.

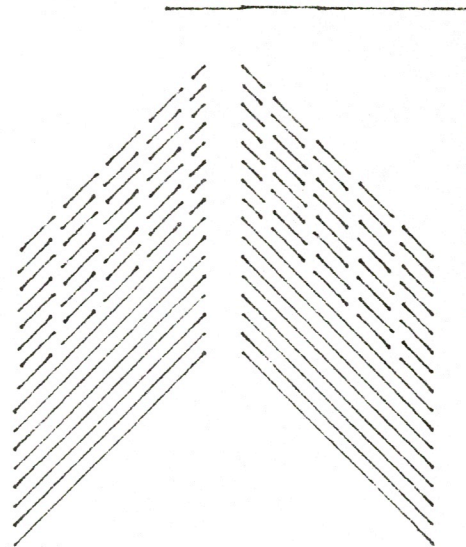
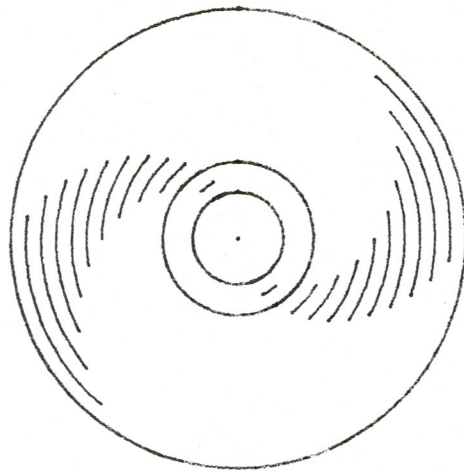
That is:

- Load the paper into the plotter. (The "size A" on the screen refers to an "A" on the plotter table, which indicates the width of the paper.)
- Press <RETURN>.

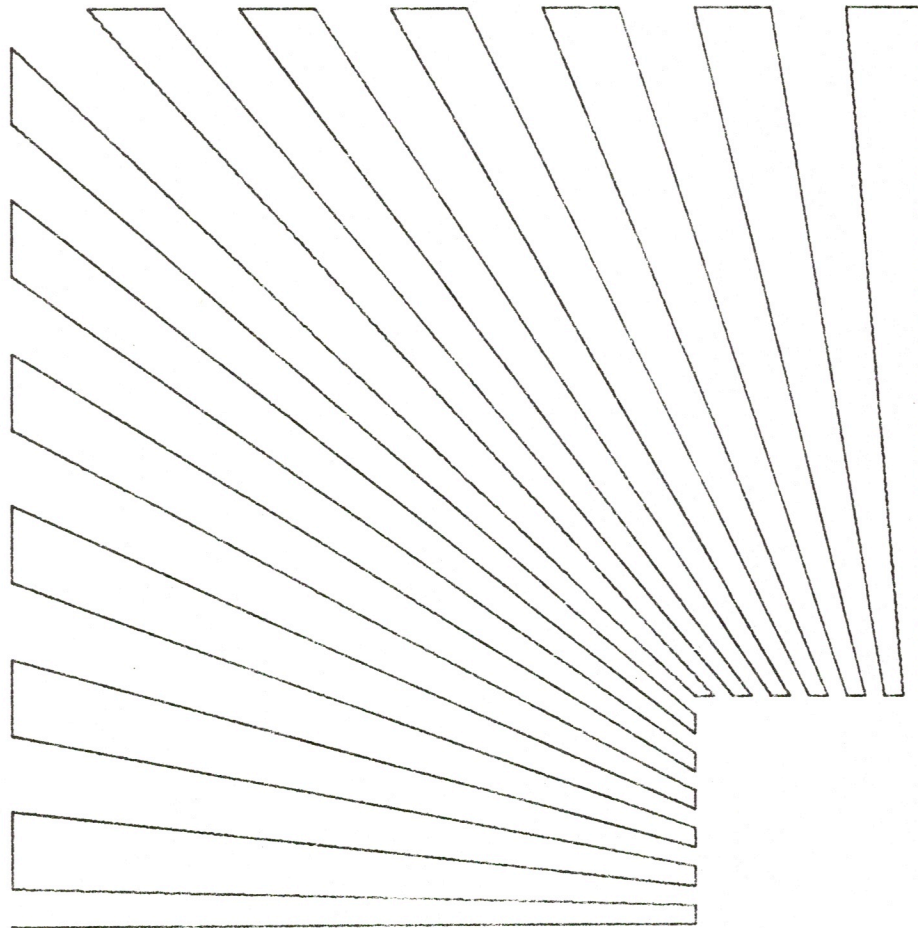
The plotter should now draw a test pattern. See Figure 4, on the following page, for an example.

FIGURE 4

ABCDEFGHIJKLMNOPQRSTUVWXYZ



PLOTTER TEST





# Apple Color Plotter Technical Procedures

## Section 3

### Take-Apart

#### Contents:

Introduction.....	3.3
Tools Needed for Procedures.....	3.3
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Remove and Replace Carriage/Bed Assembly.....	3.7
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Replace.....	3.9
Keyboard Assembly	
Remove.....	3.9
Replace.....	3.11
Remove and Replace On-Off Switch.....	3.11
Transformer	
Remove.....	3.13
Replace.....	3.15
Paper Feed Roller Motor	
Remove.....	3.15
Replace.....	3.17
Remove and Replace Left Pulley Assembly.....	3.17
Pulley Motor	
Remove.....	3.19
Replace.....	3.23
Carriage Wire	
Replace.....	3.23
Adjust.....	3.29
Solenoid	
Remove and Replace.....	3.31
Adjust.....	3.31
Remove and Replace Home Position Switch.....	3.33
Pen Carriage	
Remove.....	3.33
Replace.....	3.35
Remove and Replace Fuse.....	3.35
Remove and Replace Bail Spring.....	3.37



## INTRODUCTION

These procedures are constructed so you can find the replacement or adjustment you are interested in by using the table of contents as a reference guide.

Since there is no formal training on this product, go through this entire procedure if you have not done so previously. It is probably not necessary for you to practice the soldering in the removal and replacement of the ON-OFF switch.

Be sure to:

- follow the removal procedures in the order in which they are presented. Then reassemble the plotter, in the reverse order.
- perform the adjustments when they are referred to in the replacement sections (i.e., do the solenoid adjustment as part of replacing the solenoid, and do the carriage wire adjustment when replacing the pulley motor).
- perform the carriage wire replacement. The first time it can be very tricky!
- remove and replace both motors.

Remember the following points in reading these procedures:

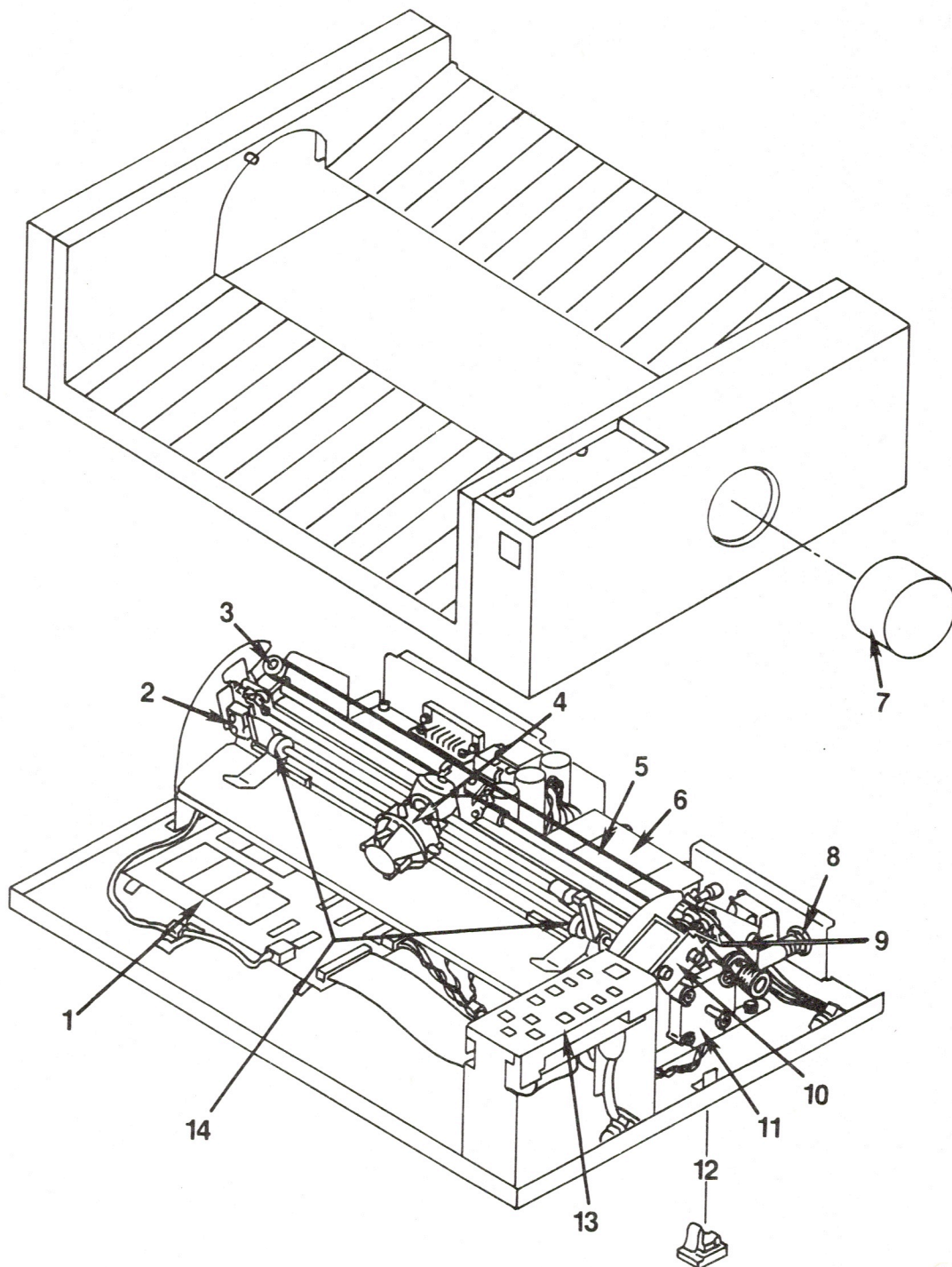
- Unless otherwise noted, any direction designations assume the plotter is facing you in the usual operating position.
- The adjustments are approximate. It is not necessary to measure the gaps using feeler gauges or calipers.
- **In all cases, when replacing parts or making any of the adjustments, first turn off and unplug the plotter.**

## Tools Needed for All Procedures

- Medium phillips screwdriver
- Medium flat blade screwdriver
- 1.5 mm allen wrench
- 5.5 mm nutdriver
- Needlenose pliers
- Tape



# FIGURE 1



## **REMOVE AND REPLACE COVER**

### **Remove Cover**

1. Unplug the plotter.
2. Remove the pens from the pen carriage.
3. Turn the plotter over and set it on its top, being careful that the plastic cover remains closed.
4. Remove the black tab (Figure 1, #12) from the bottom plate of the plotter. It is located on the left side of the plotter directly over the paper feed knob (Figure 1, #7). (Little raised arrows on the tab indicate which direction to push the tab before lifting it off.)
5. To remove the paper feed knob, loosen the two set screws on the knob shaft by inserting the allen wrench in the hole made by the removal of the black tab (Figure 1, #12). (Push knob in to turn shaft.) Pull the knob free.
6. Remove the four phillips head screws from the bottom plate.
7. Set the plotter on its feet.
8. Lift the cover free.

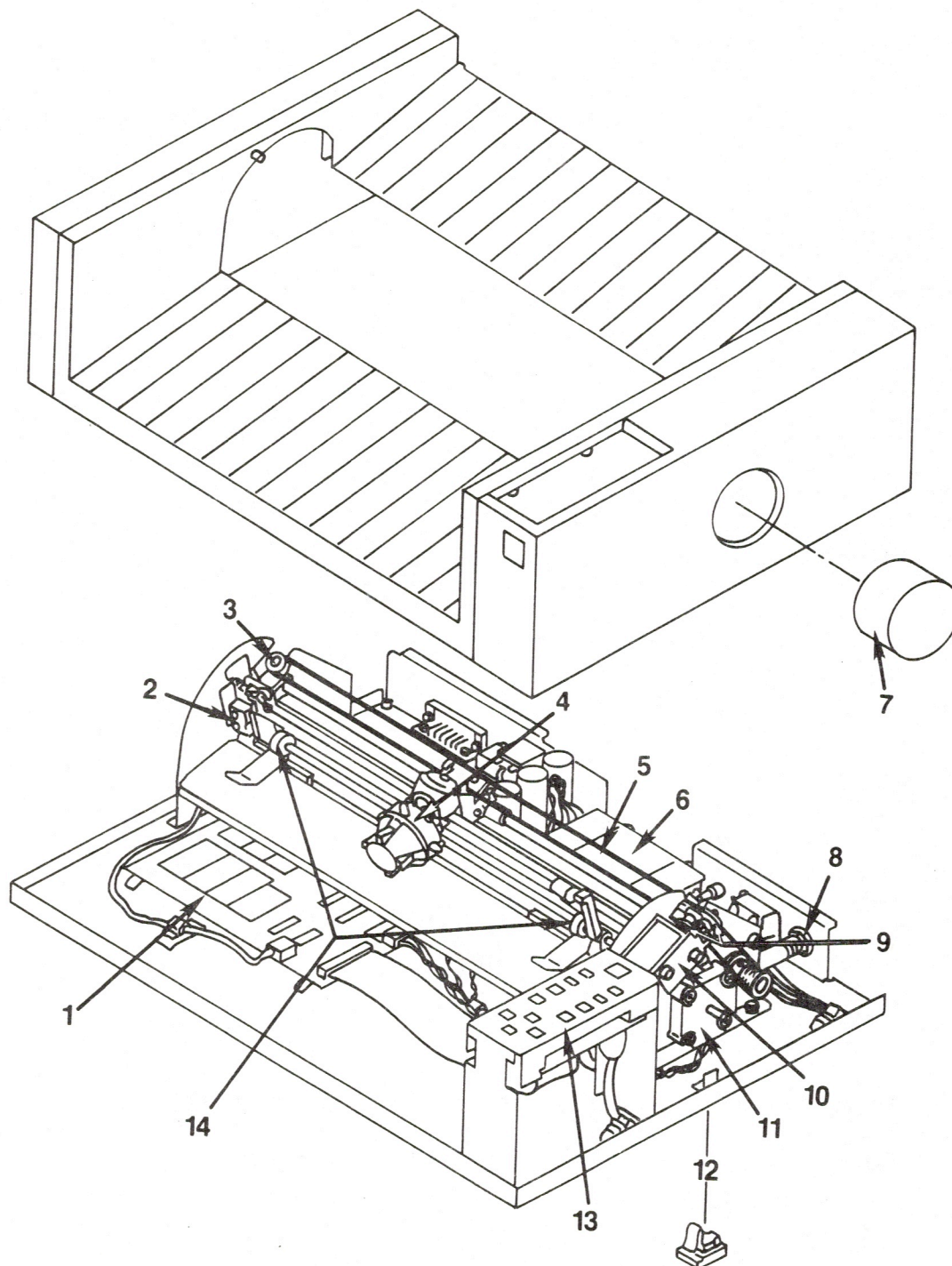
### **Replace Cover**

First check that all five connectors are in place with the cables in the clamps. Check that the carriage wire is wound correctly and sitting in the pulley guides.

1. Place the cover on the base.
2. Turn the plotter over and set it on its top, being careful that the plastic cover remains closed.
3. Replace the paper-feed knob and tighten the set screws.
4. Reinsert the black tab on the bottom plate.



# FIGURE 2





## **REMOVE AND REPLACE CARRIAGE/BED ASSEMBLY**

### **Remove Carriage/Bed Assembly**

1. Remove cover.
2. Remove the four phillips head screws, two from either side of the carriage/bed assembly.
3. Disconnect the four cables (all except the transformer cable) from the main PC board and from the two routing clamps which hold the cables to the base. (To release the cables push down on the outside of the clamp and pull up on the body.) You may have to lift the carriage/bed assembly to access two of the connectors.
4. Remove the carriage/bed.

### **Replace Carriage/Bed Assembly**

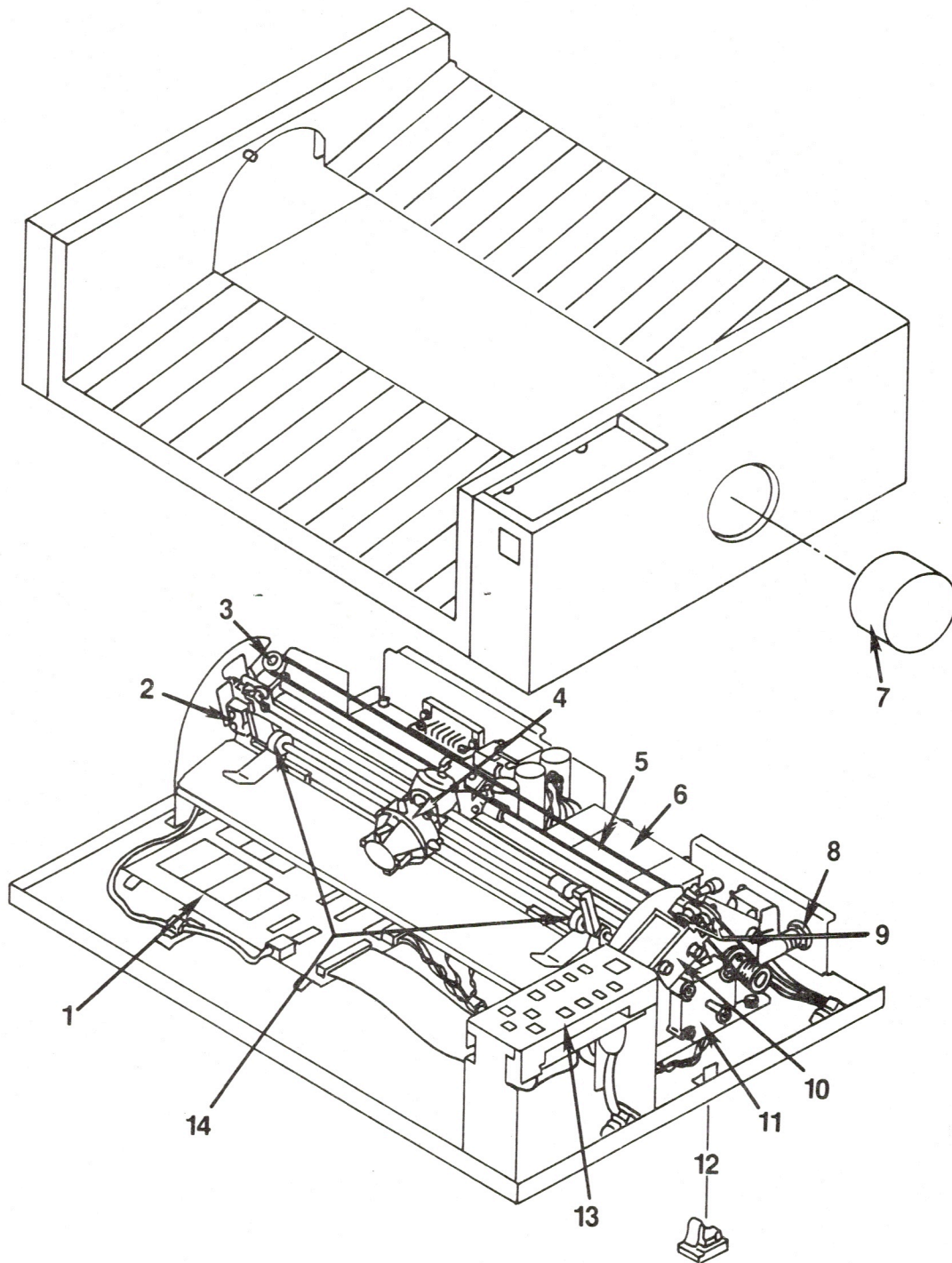
1. Set the carriage/bed assembly on the base.
2. Connect the cables to the PC board. (The two motor cables are connected to the PC board under the carriage/bed assembly. The rear motor is connected at CN4. The front motor is connected at CN5. The solenoid cable is fed under the carriage/bed assembly to CN3. The home position switch is connected at CN7.) Put the cables in the two clamps which hold the cables to the base.
3. Replace the four screws.
4. Replace the cover.

## **REMOVE AND REPLACE MAIN PC BOARD**

### **Remove Main PC Board - Figure 2, #1.**

1. Remove the cover.
2. Remove the carriage/bed assembly.
3. Disconnect the transformer connector.

# FIGURE 3





4. Disconnect the keyboard connector.

**Caution:** The ribbon cable is attached by a strip connector. To remove the cable, grasp it as close to the connector as possible and pull to the right as you gently wriggle it out.

5. The PC board is attached to the base by four stand-offs and by two screws which are threaded through a bracket mounted to the back of the PC board.

Remove the phillips screws on the far right and left sides of the PC board bracket. Push in the stand-offs and carefully lift the board from the base.

#### **Replace Main PC Board**

1. Place the PC board on the base and push down to engage the stand-offs.
2. Replace the screws.
3. Connect the transformer and keyboard connector.
4. Replace the carriage/bed assembly.
5. Replace the cover.

#### **REMOVE AND REPLACE KEYBOARD ASSEMBLY**

**Remove Keyboard Assembly - Figure 3, #13.**

1. Remove the cover.
2. Disconnect the ribbon cable from the main PC board.

**Caution:** The ribbon cable is attached by a strip connector. To remove the cable, grasp it as close to the connector as possible and gently wriggle it out.

3. Remove the two phillips head screws which attach the keyboard assembly to the base.
4. Remove the ON/OFF switch wires from the routing clamps on the base.





5. Remove the ON/OFF switch from the keyboard assembly by removing the phillips head screw and lock washer.

#### **Replace Keyboard Assembly**

1. Place the ON/OFF switch in the new keyboard assembly. Screw in phillips head screw and lock washer to hold it in place.
2. Place the keyboard assembly on the bottom plate. Put the leads from the ON/OFF switch in the routing clamps. Tighten down the two sets of phillips head screws and lock washers.
3. Connect the ribbon cable to the main PC board.
4. Replace the cover.

#### **REMOVE AND REPLACE ON/OFF SWITCH**

##### **Remove ON/OFF Switch**

The ON/OFF switch is located on the keyboard assembly.

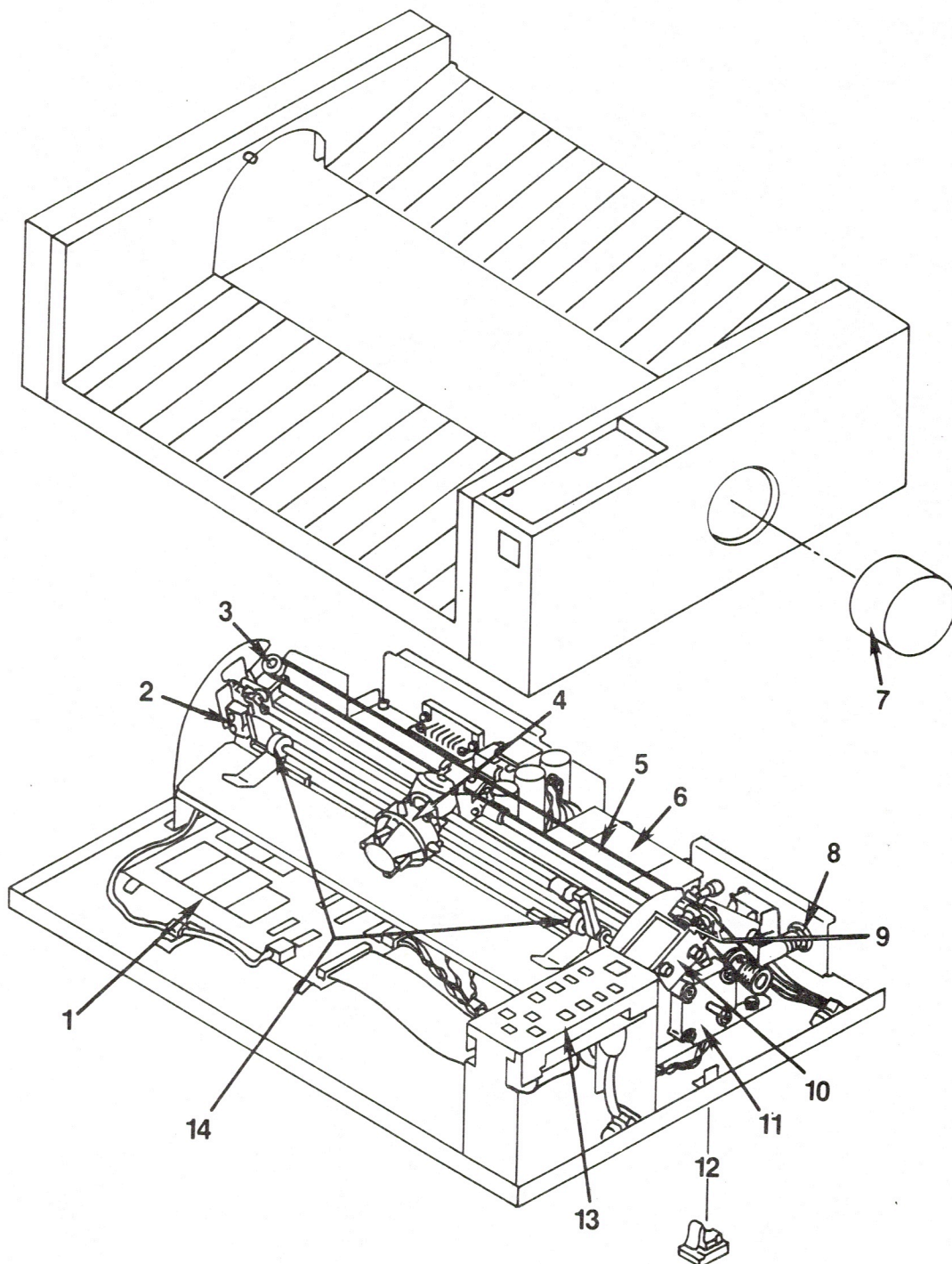
1. Remove the cover.
2. Disconnect the ON/OFF switch from keyboard by removing the phillips screw and lock washer from the back of the keyboard.
3. Carefully cut off the shrink tubing with an X-acto knife.
4. Use a soldering iron to remove the cables from the terminals.

##### **Replace ON/OFF switch**

1. Slide an approximately 4 cm (1 1/2 inch) piece of approximately 1.8 cm (3/4 inch) diameter shrink tubing over the leads.

**WARNING:** You must replace the shrink tubing to avoid the possibility of electric shock.

FIGURE 4





2. Solder the leads to the switch. With the switch in the installed orientation, like-colored leads should be on the same side. The thicker leads should be attached to the center terminals. The thinner leads should be attached to the bottom terminals.
3. Slide the shrink tubing up over the terminals and heat it until snug.
4. Attach the ON/OFF switch to the keyboard assembly with the phillips head screw and lock washer.
5. Push switch in and out to be sure it works and is installed properly.
6. Replace the cover.

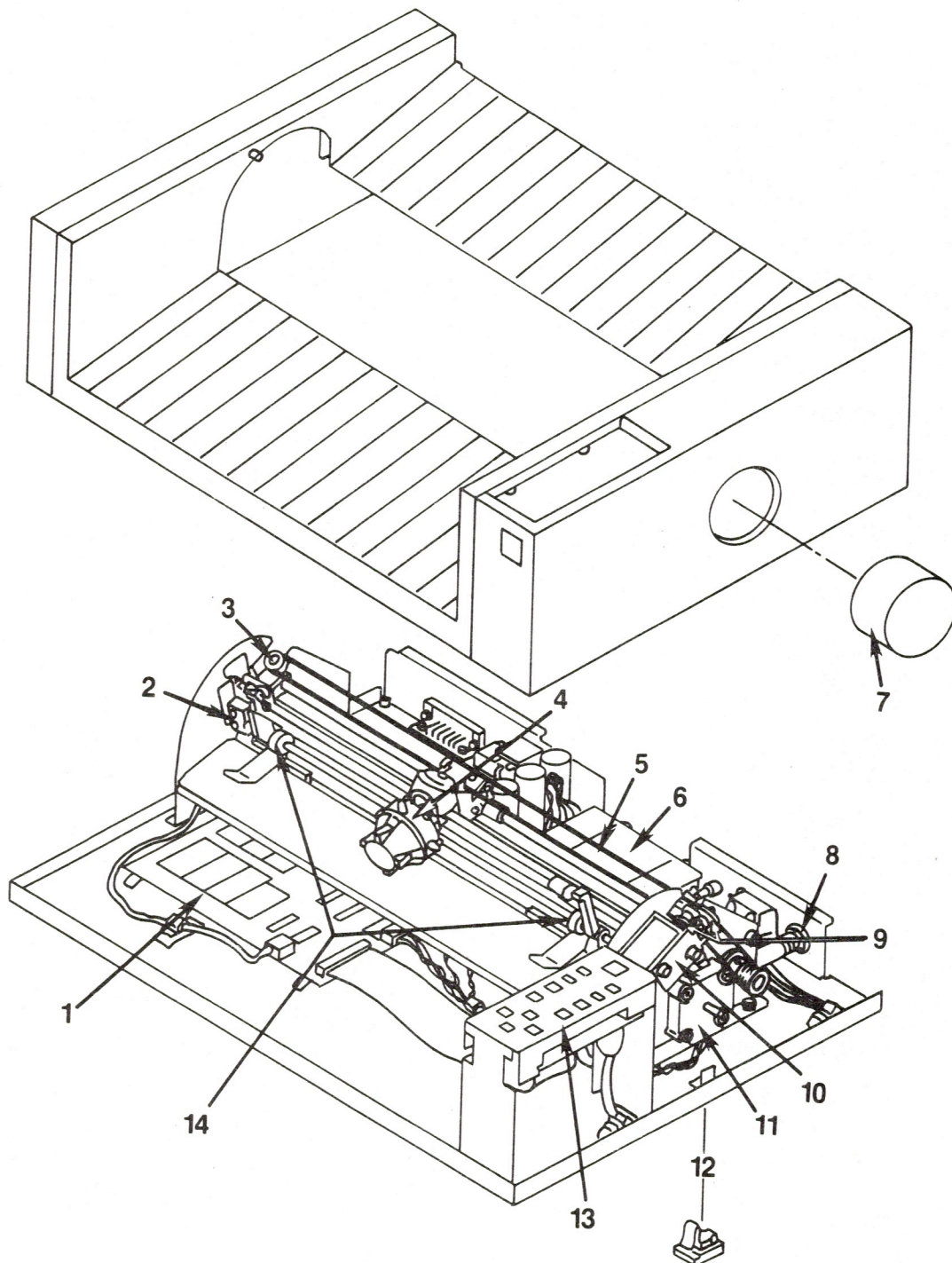
#### **REMOVE AND REPLACE TRANSFORMER**

**Remove Transformer** - Figure 4, #6.

1. Remove the cover.
2. Remove the carriage/bed assembly.
3. Disconnect the transformer connector from the main PC board.
4. Remove the four screws that attach the transformer to the base plate.
5. Cut the cable-tie at the AC power socket.
6. Release the wires from the routing clamps.
7. Remove the ON/OFF switch from the keyboard assembly.
8. Desolder all the leads from the ON/OFF switch.

**NOTE:** This will allow you to install new shrink tubing.

**FIGURE 5**





## **Replace Transformer**

1. Slide an approximately 4 cm (1 1/2 inch) piece of approximately 1.8 cm (3/4 inch) diameter shrink tubing over the ON/OFF switch leads.

**WARNING:** You must replace the shrink tubing to prevent the possibility of electric shock.

2. Solder the leads to the switch. With the switch in the correct orientation, like-colored leads should be on the same side. The thicker leads should be attached to the center terminals. The thinner leads should be attached to the bottom terminals.
3. Slide the shrink tubing up and apply heat to shrink it.
4. Replace the ON/OFF switch.
5. Wind the leads from the ON/OFF switch through the routing clamps back toward the transformer. Lock the clamps.
6. Screw down the transformer.
7. Connect the transformer connector to the main PC board.
8. Gather the AC power wires and the transformer power wires into a cable-tie.
9. Replace the carriage/bed assembly.
10. Replace the cover.

## **REMOVE AND REPLACE PAPER FEED (ROLLER) MOTOR**

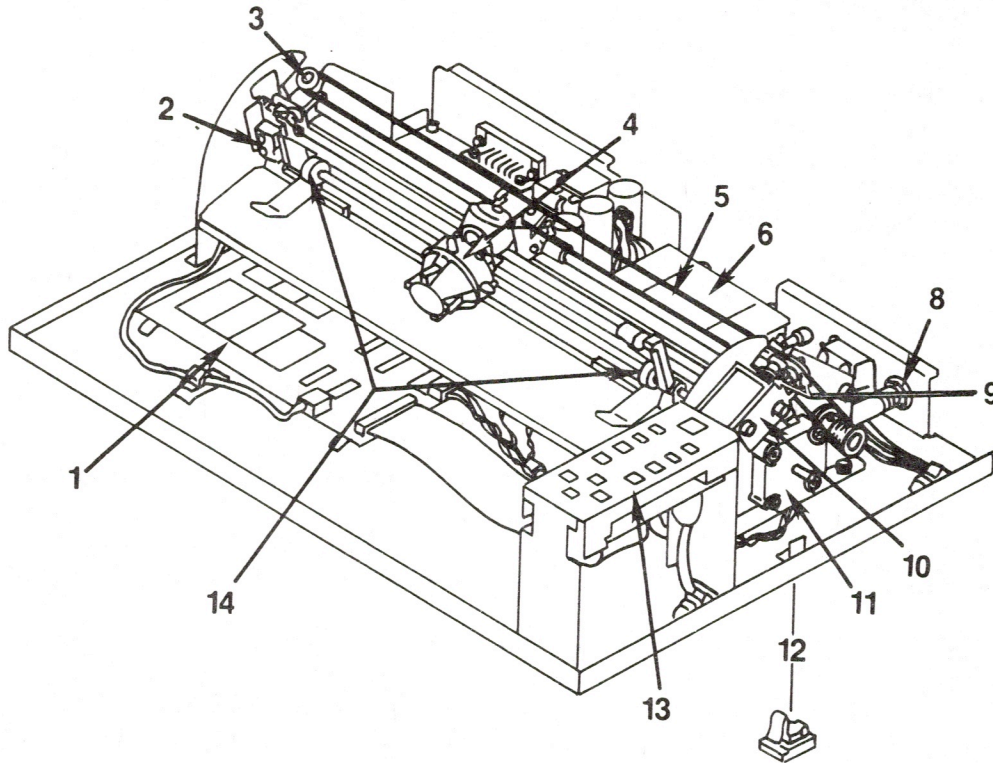
**Remove Paper Feed (Roller) Motor** - Figure 5, #11.

This motor is the front motor on the right end of the carriage/bed assembly

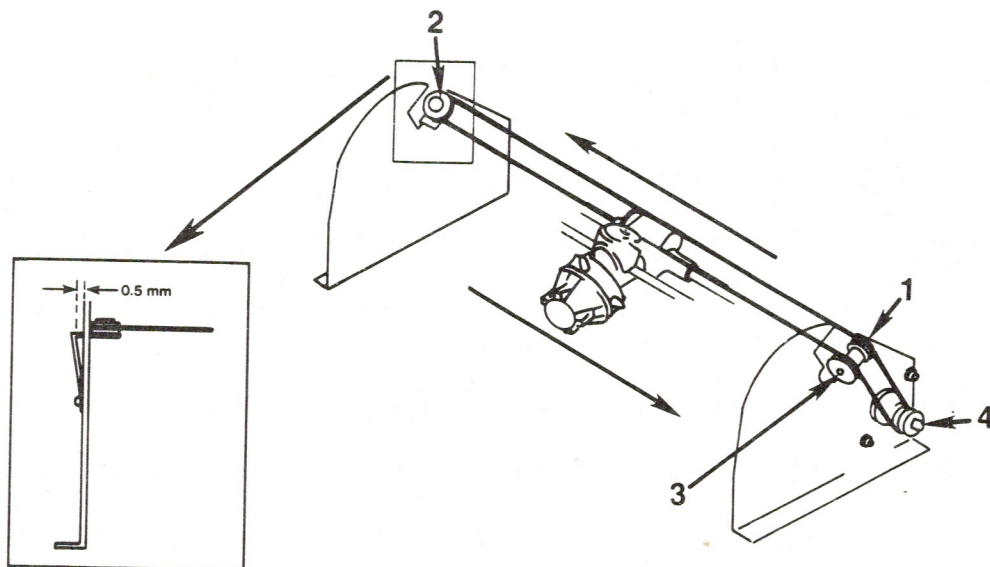
1. Remove the cover.
2. Remove the carriage/bed assembly from the base.
3. Remove the nuts from the motor using a 5.5 mm nutdriver.
4. Pull the motor out. (The roller will come with it.)



**FIGURE 6**



**FIGURE 7**



5. Use an allen wrench to loosen the set screws that attach the motor to the roller. Pull the roller and motor apart.

**Note:** You may have to use a large flatblade screwdriver to separate them.

#### **Replace Paper Feed (Roller) Motor**

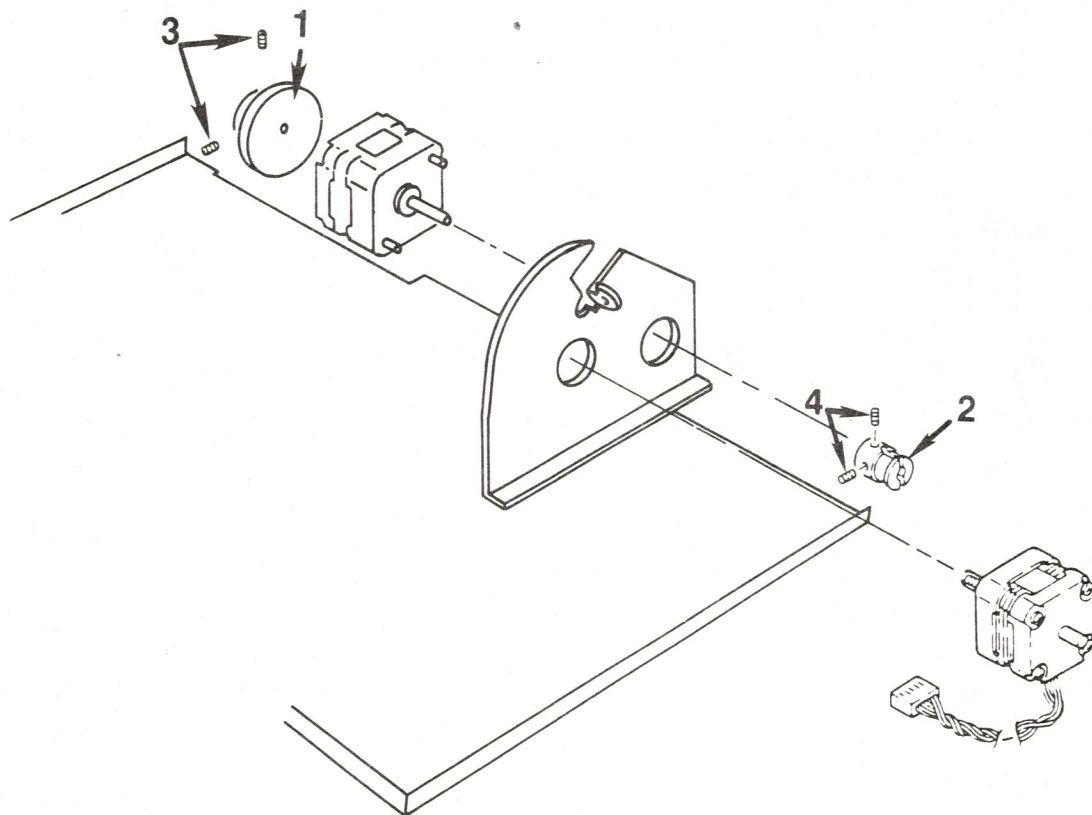
1. Place the new motor on the roller with a gap of approximately 1.5 mm (1/16 inch) between the roller and motor. Tighten the set screws.
2. Orient the motor so the wires exit downward.
3. Slide the roller and motor back into place. (The motor should fit snugly to the frame.) If you are having trouble, try the following:
  - Line up the motor mounting screws with the carriage bed assembly.
  - Depress the right feed roller arm and/or the left feed roller tab (Figure 6, #14) to give the roller more room to move.
  - Poke a small screwdriver through the hole in the left outside of the carriage/bed assembly to maneuver the end of the roller into place.
4. Replace the nuts, tightening alternately (the star washer goes with the top nut).
5. Replace the carriage/bed assembly.
6. Replace the cover.

#### **REMOVE AND REPLACE LEFT PULLEY ASSEMBLY - Figure 6, #3.**

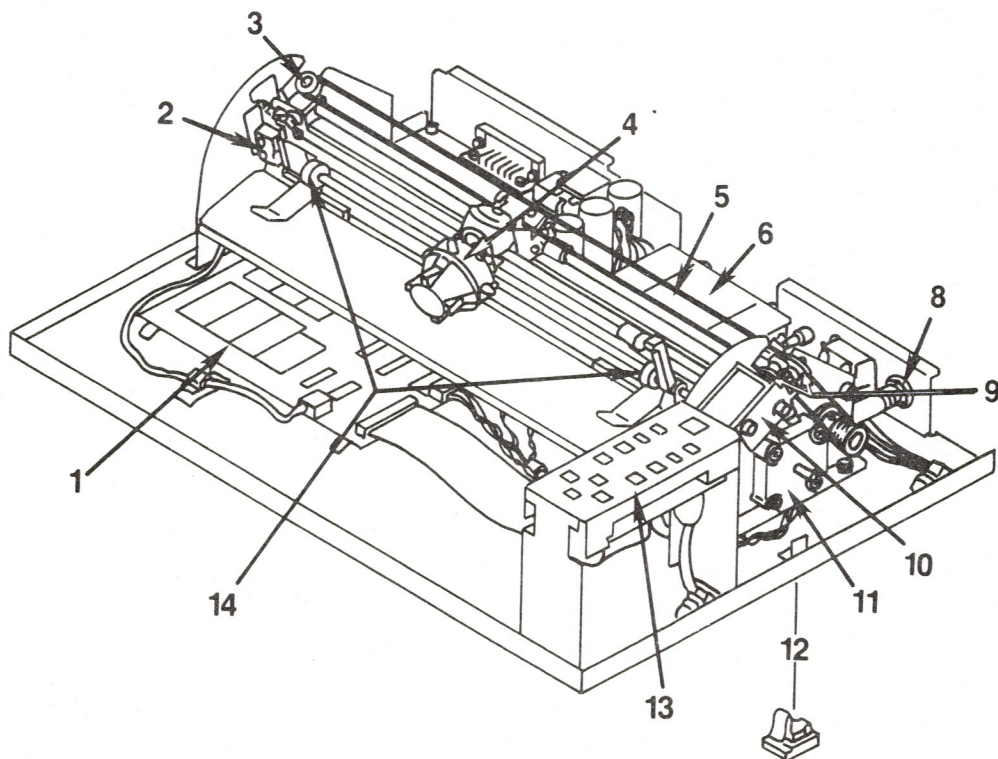
The left pulley assembly attaches the left pulley to the carriage/bed assembly.

1. Put a piece of tape on the motor pulley (Figure 7, #4) so that the carriage wire will not unwind.

# FIGURE 8



# FIGURE 9





2. Remove and replace the left pulley assembly by removing and replacing the mounting screw on the bracket.

**NOTE:** When in place, the pulley should be inside the frame of the carriage assembly. (See Figure 7, insert.)

3. Remove the tape from the motor pulley.

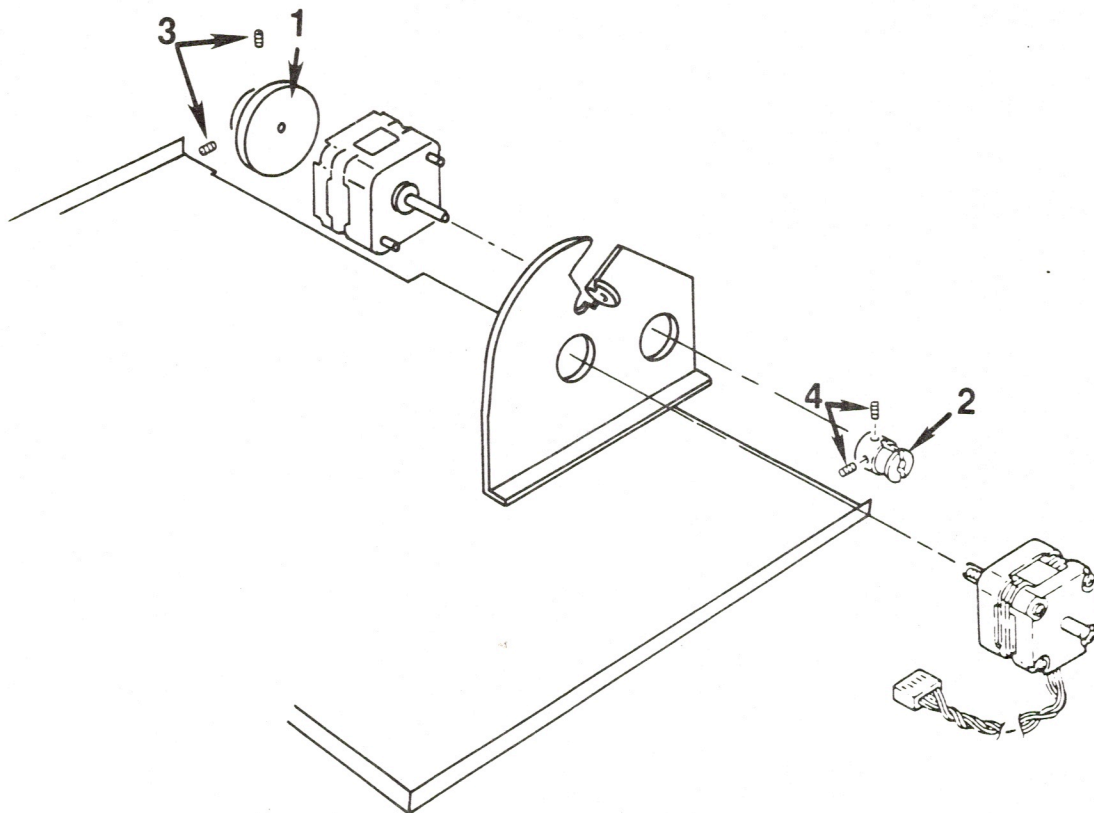
## **REMOVE AND REPLACE PULLEY MOTOR**

### **Remove Pulley Motor**

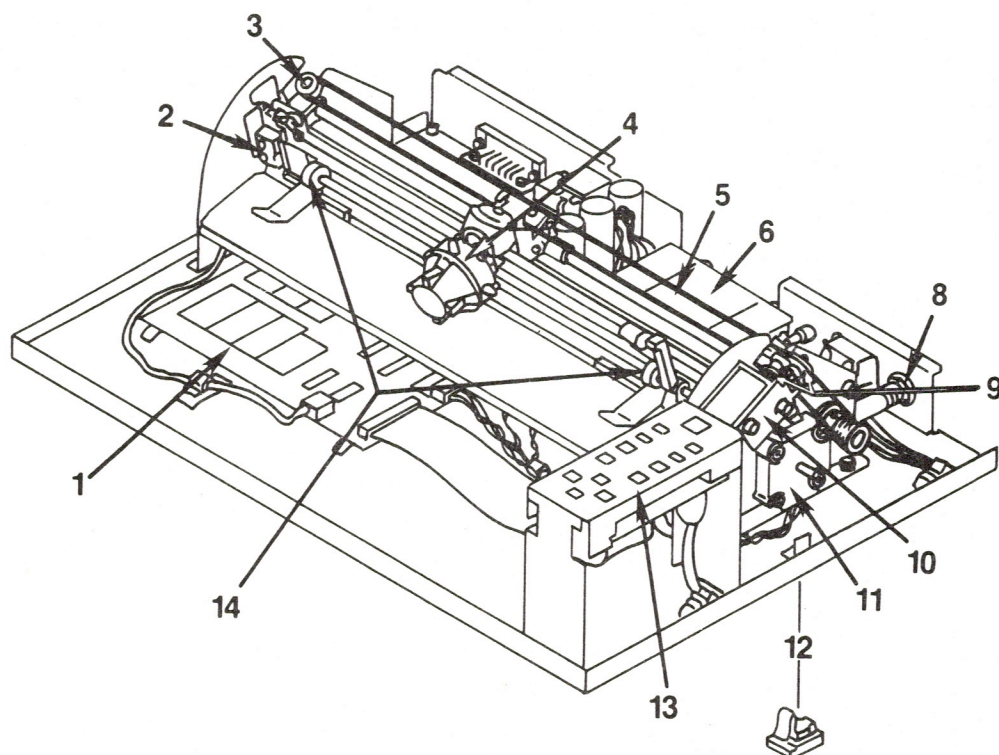
This motor is the rear motor on the right end of the carriage/bed assembly.

1. To remove the flywheel (Figure 8, #1), rotate the motor pulley (Figure 8, #2) and flywheel so that the hole in the flywheel lines up with the set screws (Figure 8, #3) in the shaft. Loosen the two set screws.
2. Slide the flywheel off.
3. Slide the pen carriage (Figure 9, #4) to the middle of the carriage/bed assembly.
4. Loosen the retaining clamp screw (the easily visible phillips head screw on top of the pen carriage assembly that holds the carriage wire).

**FIGURE 10**



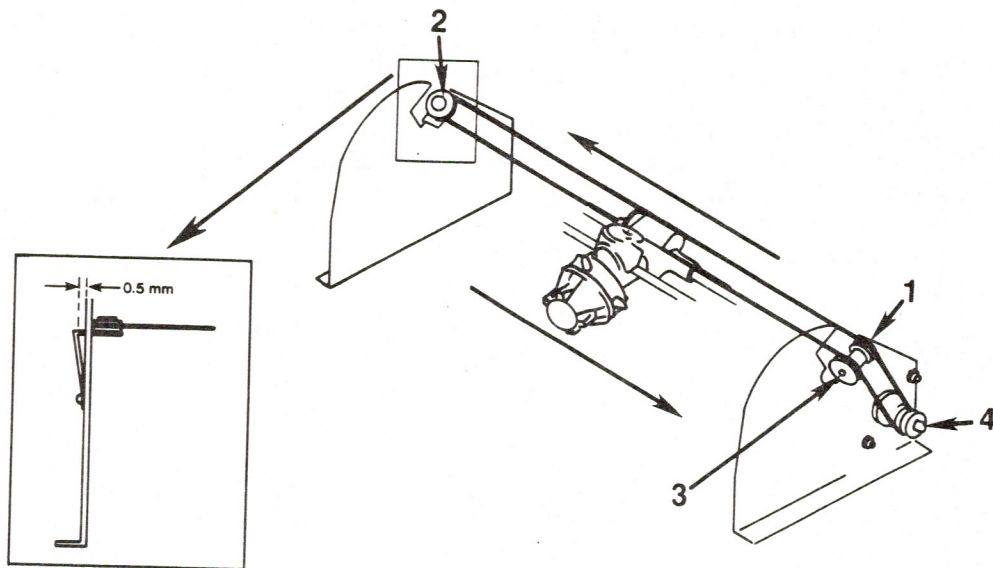
**FIGURE II**



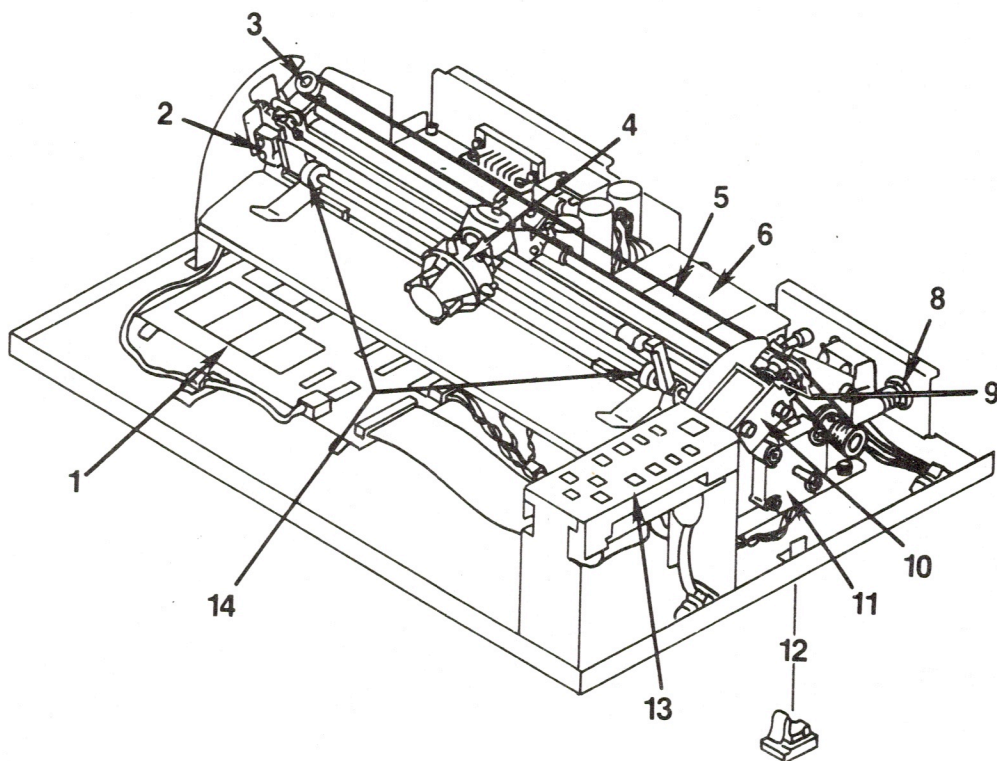
5. Loosen the two set screws (Figure 10, #4) on the motor pulley.
6. To ensure the carriage wire does not unwrap during the following steps, put some tape around the wrapped wires on the motor pulley.
7. Release the carriage wire tension by loosening the nuts on the pulley motor.
8. To further release the carriage wire tension, loosen but do not remove the mounting screw for the left pulley assembly. (Figure 11, #3.)
9. Slide the wire off the left pulley assembly. Gently but firmly pull the pulley away from the pulley motor. (You may have to use a flatblade screwdriver to pry it loose.)
10. Remove the nuts from the screws that hold the motor in place.
11. Remove the motor.



# FIGURE 12



# FIGURE 13



## **Replace Pulley Motor**

1. Put the motor into place (wires exiting downward).
2. Loosely replace the nuts for the motor (star washer belongs with top nut).
3. Slide the pulley back onto the motor. There should be an approximately 1.5 mm (1/16 inch) gap between the pulley and the side of the carriage/bed assembly.
4. Slide the carriage wire back over the left pulley. Ensure that the carriage wire is correctly mounted on the guide pulleys.
5. Remove the tape from the motor pulley and tighten down the set screws.
6. Tighten the left pulley-assembly mounting screw.
7. Turn the motor pulley until it has an equal number of turns on either side of where the carriage wire leaves the motor pulley.
8. Ensure that the pen carriage is in the middle of the carriage/bed assembly.
9. Place the carriage wire under the retaining clamp on the pen carriage. Tighten the retaining clamp screw.
10. Adjust the wire tension (see Carriage Wire Adjustment section) and tighten down motor pulley nuts.
11. Replace the flywheel. There should be an approximately 3 mm (1/8 inch) gap between the flywheel and the motor. Alternately tighten the set screws until they are completely tight.

## **REPLACE AND ADJUST CARRIAGE WIRE**

**Replace Carriage Wire** - Figure 13, #5.

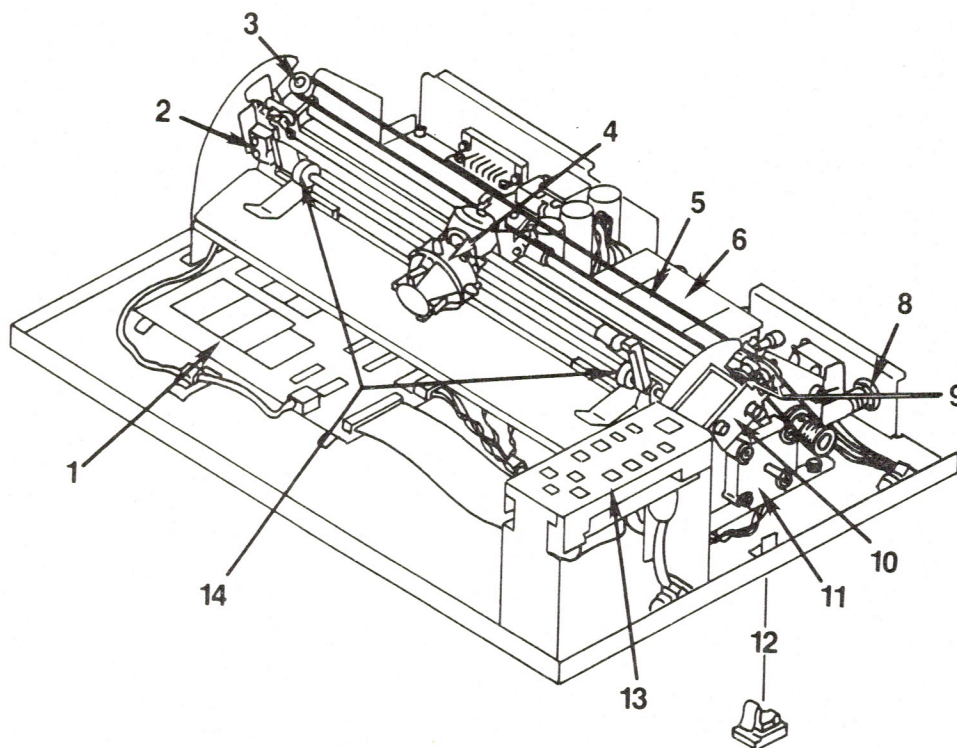
Replace the wire if it is kinked, worn, or otherwise damaged.

1. Cut or otherwise remove the old wire.

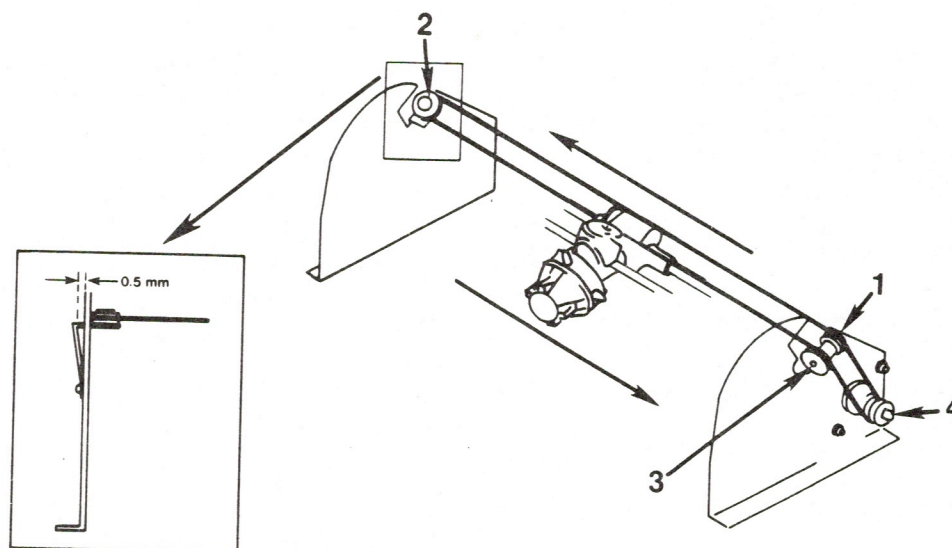
**NOTE:** Treat the new wire gently. It kinks easily.



# FIGURE 14



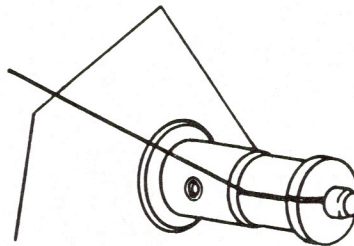
# FIGURE 15





2. Loosen but do not remove the nuts on the pulley motor and the mounting screw for the left pulley assembly (Figure 14, #3).
3. Loosen the retaining clamp screw on the pen carriage (Figure 14, #4).
4. Tear off a piece of tape and leave it easily accessible.
5. There are two slots in the motor pulley (Figure 15, #4). Insert one end of the carriage wire into the long slot (Figure 16) and slide it to the inside (center) of the pulley.

**FIGURE 16**

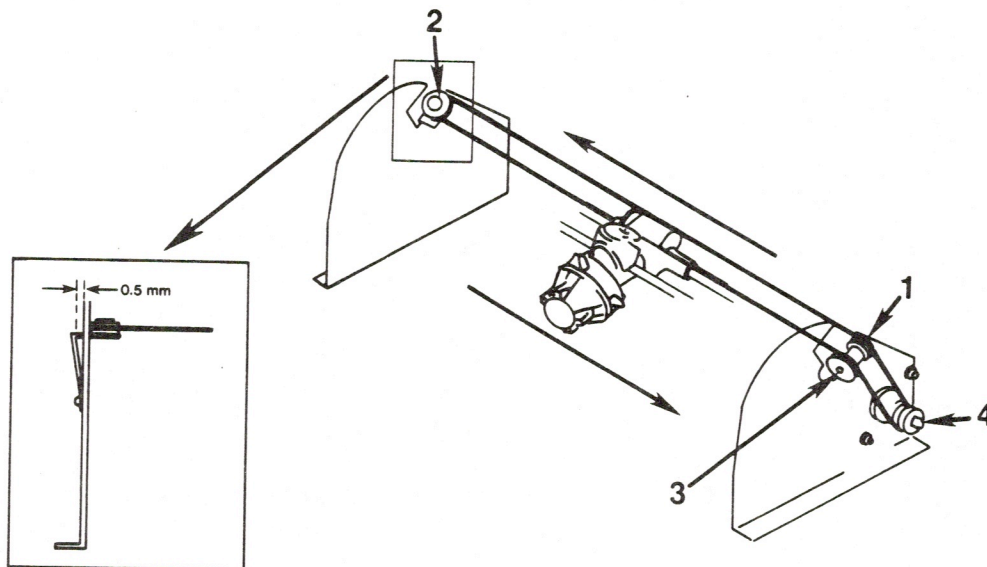


6. Keeping the wire taut, manually wind the wire onto the pulley by rotating the pulley clockwise nine revolutions.

**NOTE:** Make sure the loops of the wire do not overlap.

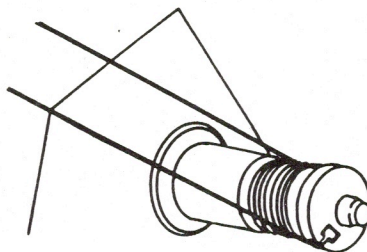
Once the wire is wound, hold it down with the tape.

FIGURE 17



7. Thread the wire around the guide pulleys, following the arrows, in numerical order as shown in Figure 17, #1, #2, and #3.
8. Place the tape on the motor pulley so that you can access the short slot of the pulley.
9. Slip the end of the carriage wire into the short slot of the motor pulley. (See Figure 18.) This should be a tight fit. If it isn't tight, give the pulley another revolution.

**FIGURE 18**

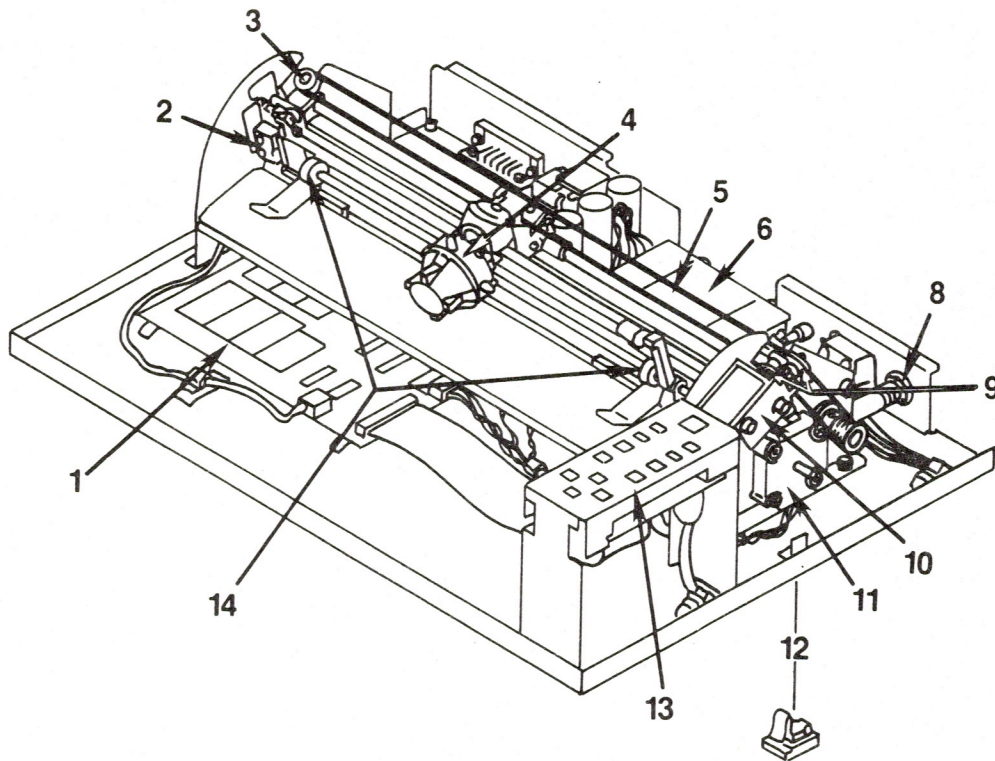


(If you have trouble slipping the wire into place, remove the wire from the left guide pulley, slide the wire end into place, and then pull the wire back onto the guide pulley.)

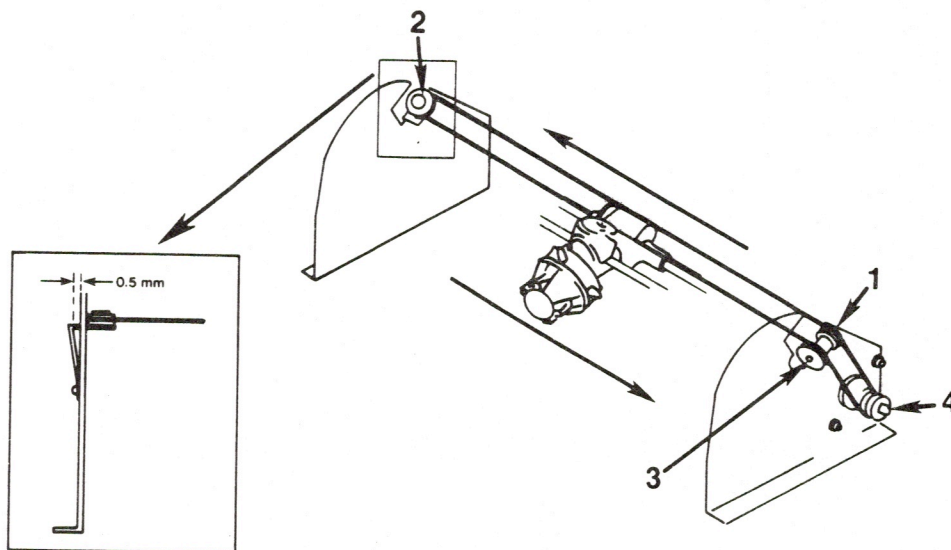
10. Tighten the mounting screw for the left guide pulley.
11. Adjust the wire tension (see steps in the following section).
12. Remove the tape from the pulley motor.
13. Turn the motor pulley until it has an equal number of turns on either side of where the carriage wire leaves the motor pulley.
14. Slide the pen carriage to approximately the middle of the carriage/bed assembly.
15. Place the carriage wire closest to you under the retaining clamp on the pen carriage. Tighten the retaining clamp screw.



# FIGURE 19



# FIGURE 20



16. Slide the pen carriage back and forth to check that it can reach both ends of the carriage/bed assembly.  
(Note: The right feed-roller should be to the far right.)

If the pen carriage cannot reach both ends, loosen the retaining clamp on the carriage assembly, move the pen carriage in the direction that was difficult to reach, and then tighten the retaining clamp and try it again.

### **Adjust Carriage Wire Tension**

Read the following two paragraphs before proceeding with the numbered steps.

The carriage wire tension is adjusted by rotating the pulley motor.

The wire tension is correctly adjusted when the left pulley assembly (Figure 19, #3) is approximately 0.5 mm (1/48 inch) from the carriage/bed assembly when measured at the upper end of the left pulley assembly. (See insert, Figure 20.)

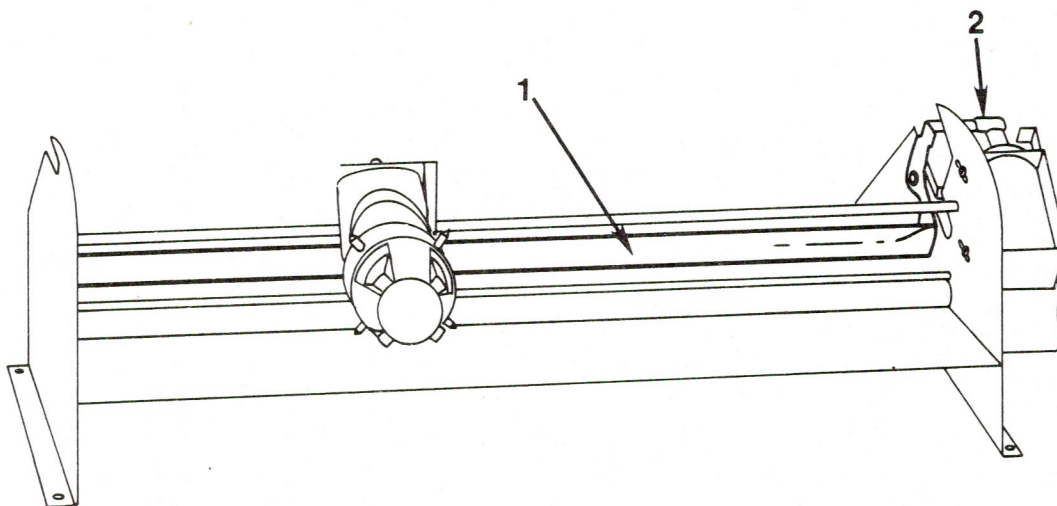
To adjust the tension:

1. Loosen the nuts which attach the pulley motor to the carriage/bed assembly.
2. Adjust the carriage wire tension by rotating the motor while watching the gap at the upper end of the left pulley assembly. When the gap is approximately .5 mm (1/48 inch), tighten down the bolts.
3. Tighten the nuts when the pulley assembly is correctly adjusted.

**NOTE:** If you were replacing the carriage wire, return to step 12 of the Replace Carriage Wire section above and continue from there.

**NOTE:** If you were replacing the pulley motor, return to step 10 of Replace Pulley Motor and continue from there.

**FIGURE 21**





## **REMOVE, REPLACE, AND ADJUST SOLENOID**

### **Remove and Replace Solenoid - Figure 21, #2**

The solenoid moves the pen carriage up and down.

1. To remove the solenoid, remove the two screws which attach it to the carriage/bed assembly.
2. Replace the solenoid by loosely tightening the solenoid screws, adjusting the solenoid, and then tightening down the screws.

### **Solenoid Adjustment**

Read the following paragraphs before doing the numbered steps.

The solenoid adjustment determines the pen height. In making this adjustment you are concerned with the solenoid, bail, bail lever, and pen carriage.

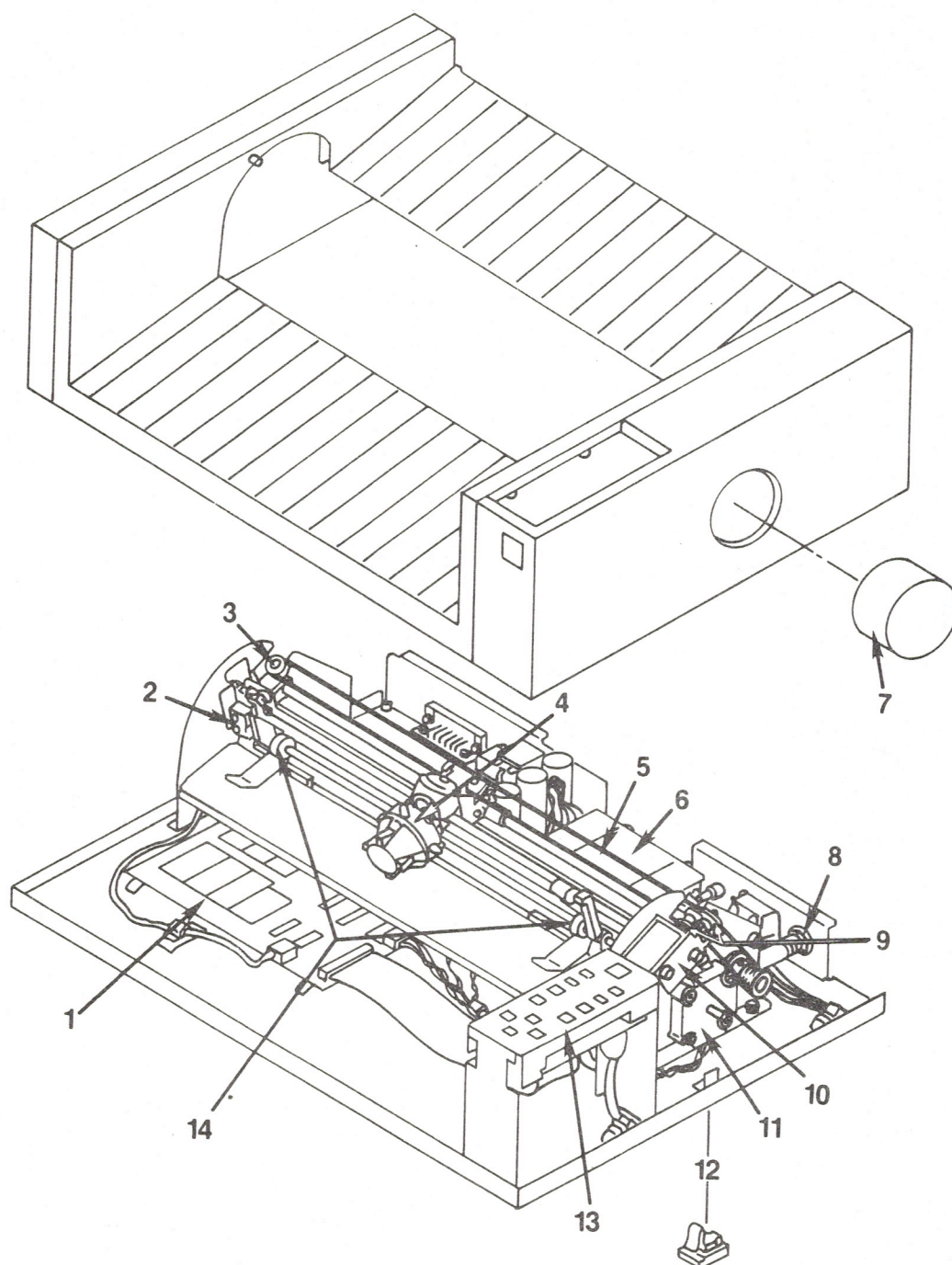
Look underneath the pen carriage to see where the bail (Figure 21, #1) comes into contact with the pen carriage. Push in bail lever to depress the cylinder on top of the solenoid (Figure 21, #2). Watch the bail move.

The gap between the bail and the pen carriage should be approximately 1 mm (measured when an uncapped pen is touching the platter and the solenoid cylinder is pushed in).

#### To adjust:

1. Put uncapped pens in pen carriage.
2. Loosen but do not remove the screws which attach the solenoid to the carriage/bed assembly.
3. Push in the solenoid cylinder by depressing the bail lever.
4. With the solenoid cylinder still depressed, guide the solenoid up and down to adjust the gap between the bail and pen carriage. Guide the solenoid up to lessen the gap.
5. When the gap is approximately 1 mm (1/24 inch) tighten the solenoid screws.

# FIGURE 22





## **REMOVE AND REPLACE HOME POSITION SWITCH ASSEMBLY -**

Figure 22, #2.

1. Disconnect the home position switch connector (CN7) from the PC board.
2. Remove the screw and washer which hold the switch bracket in place.
3. Replace the home position switch assembly and its screw.

**NOTE:** When installed, the switch and bracket should be parallel with the sides of the rectangular cut-out in the carriage/bed.

4. Feed wires back through circular hole in the left side of the carriage/bed assembly so that the connector comes out under the carriage/bed.
5. Connect the home position switch connector to the PC board.

## **REMOVE AND REPLACE PEN CARRIAGE ASSEMBLY**

**Remove Pen Carriage Assembly - Figure 22, #4.**

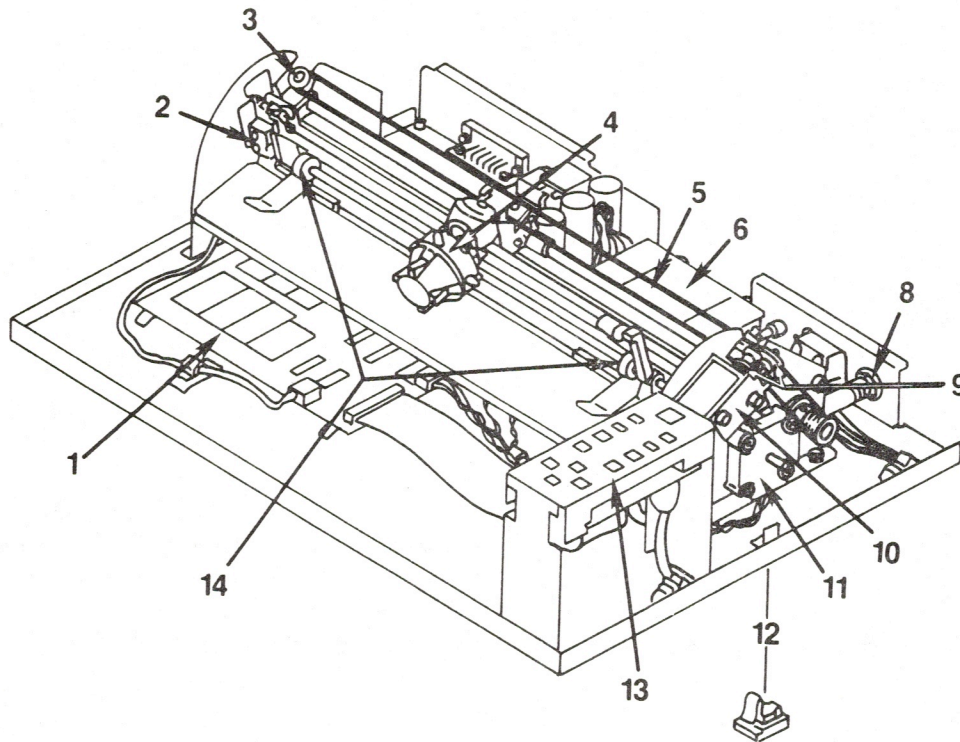
To remove the pen carriage assembly you will have to remove the two bars to which it is attached. Turn the plotter so that it is facing you.

To remove the rear bar:

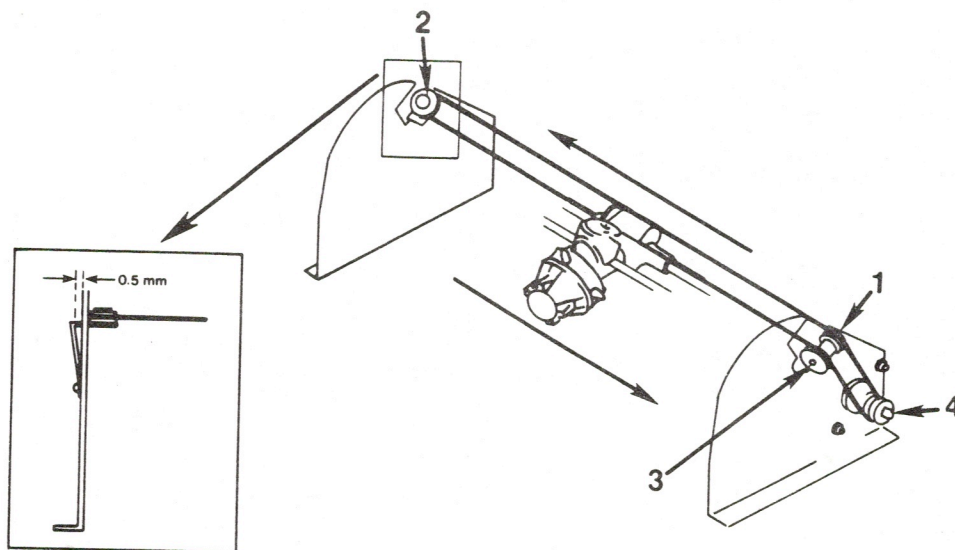
1. Remove the pens from the carriage.
2. Put tape around the wires on the motor pulley.
3. Loosen the wire-retaining-clamp screw of the pen carriage.
4. Remove the left pulley assembly (Figure 22, #3).
5. Remove the e-clip on the far right of the bar (outside of the carriage/bed) using needlenose pliers. Slide the bar out.



# FIGURE 23



# FIGURE 24



To remove the front bar:

6. Remove the screw and washer that holds in place the front bar (and the home position switch bracket [Figure 23, #2]). Pull this bar out. The pen carriage assembly is now free.

**Replace Pen Carriage Assembly**

1. Replace the rear bar, threading it through the pen carriage. Replace the left guide pulley. Put the e-clip in place.
2. Replace the forward bar, threading it through the pen carriage.
3. Replace the home position switch and tighten the screw.

**NOTE:** When installed, the switch and bracket are parallel with the rectangular cut-out in the carriage/bed.

4. Replace the left pulley assembly.

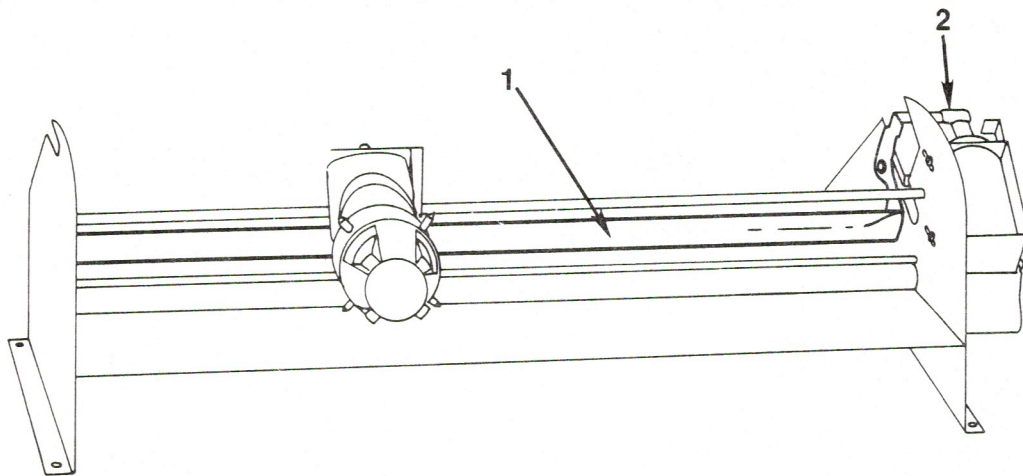
**NOTE:** When in place, the pulley should be inside the frame of the carriage assembly. (See Figure 24, insert.)

5. Put the carriage wire over the left pulley.
6. Put the carriage wire under the retaining clamp of the pen carriage and tighten the screw.
7. Check the guide pulleys (Figure 23, #3 and #9) and the motor pulley to see that the carriage wire is wound correctly.
8. Check the carriage wire tension.

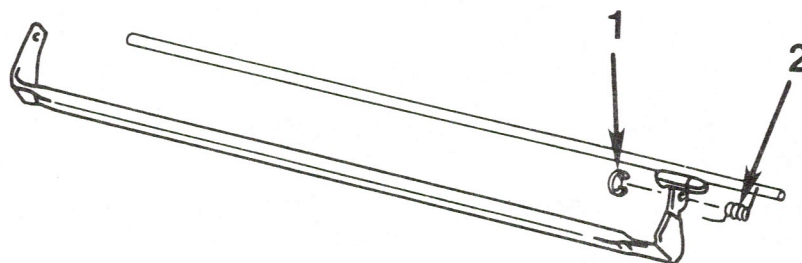
**REMOVE AND REPLACE FUSE - Figure 23, #8.**

1. Use a flatblade screwdriver to turn fuse cover 1/4 turn to the left.
2. Put new fuse in cover and replace the cover.

**FIGURE 25**



**FIGURE 26**





## **REMOVE AND REPLACE BAIL SPRING**

### **Remove Bail Spring**

The bail is the rod that is moved by the solenoid (Figure 25, #1). The spring is on the far right side of the bail, inside the carriage/bed.

1. Remove the e-clip using needlenose pliers (Figure 26, #1).
2. Gently slide the bail to the left, up, and toward you so you can get at the spring.

**NOTE:** Be careful. The bail is flexible and you can easily bend it out of shape.

3. Remove the spring.

### **Replace Bail Spring**

1. Put the spring back on the assembly. The right-angle side should be to the left.
2. Replace the bail and the e-clip.
3. The straight end of the spring should lie on top of the rear bar. (See Figure 26, #2.) The right-angled side should lie on top of the bail.



## Color Plotter Technical Procedures

### Section 4

#### Illustrated Parts List

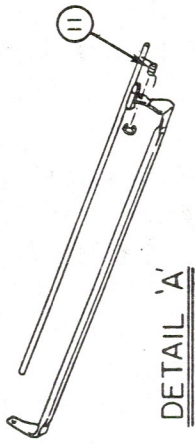
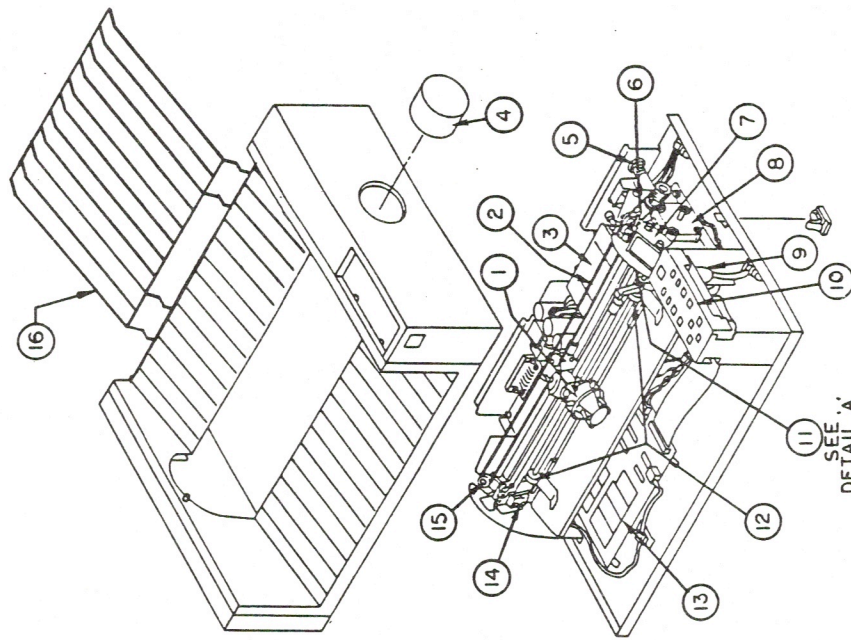
The figures and lists below include all piece parts that can be purchased separately from Apple for the Color Plotter, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

Illustrated Parts List.....	4.1
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NOTE: UNLESS OTHERWISE SPECIFIED



DETAIL 'A'

REV	ZONE	ECO #	REVISION	APPD	DATE
A		5493	INITIAL RELEASE		

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DIMENSIONS IN MILLIMETERS X R - ANGLES - TOLERANCES - MATERIAL - FINISH - DRIFT CK - ENG APPR - RELEASE - DESIGNER -		TITLE <b>ILLUSTRATED PARTS LIST</b> <b>COLOR PLOTTER</b>	
SCALE <b>N/A</b>		SIZE <b>B</b>	DRAWING NUMBER <b>070-0225-A</b>
		SHEET <b>1/1</b>	

## COLOR PLOTTER

Item	Part No.	Description
1	970-0588	Pen/Carriage Assembly
2	970-0587	String Assembly
3	970-0583	Transformer
4	970-0597	Knob/Clutch Assembly
5	740-0203	Fuse
6	970-0596	Right Pulley Assembly
7	970-0589	Solenoid Assembly
8	970-0590	Motor Assembly
9	970-0586	AC Switch
10	970-0585	Keyboard Assembly
11	970-0593	Spring
12	970-0591	Feed Roller
13	661-95147	Color Plotter Main PCB
14	970-0592	Home Switch Assembly
15	970-0595	Left Pulley Assembly
16	919-0059	Back Paper Support

End of Apple Color  
Plotter Section Start of  
Graphics Tablet Section



# GRAPHICS TABLET TECHNICAL PROCEDURES

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# Graphics Tablet Technical Procedures

## Section 1

### Apple IIe Installation

#### Contents:

Connecting the Internal Cables to the Interface Card.....	1.3
Inserting the Interface Card.....	1.4
Attaching the Cables to the Back Panel.....	1.4



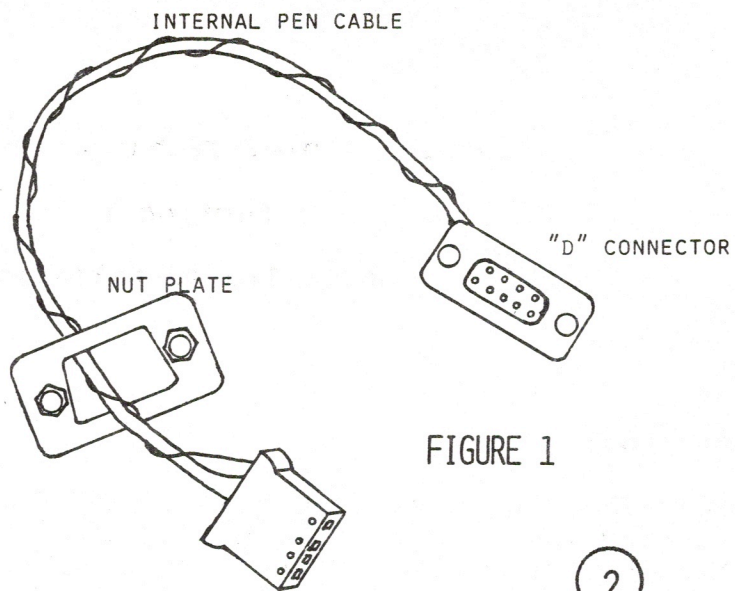


FIGURE 1

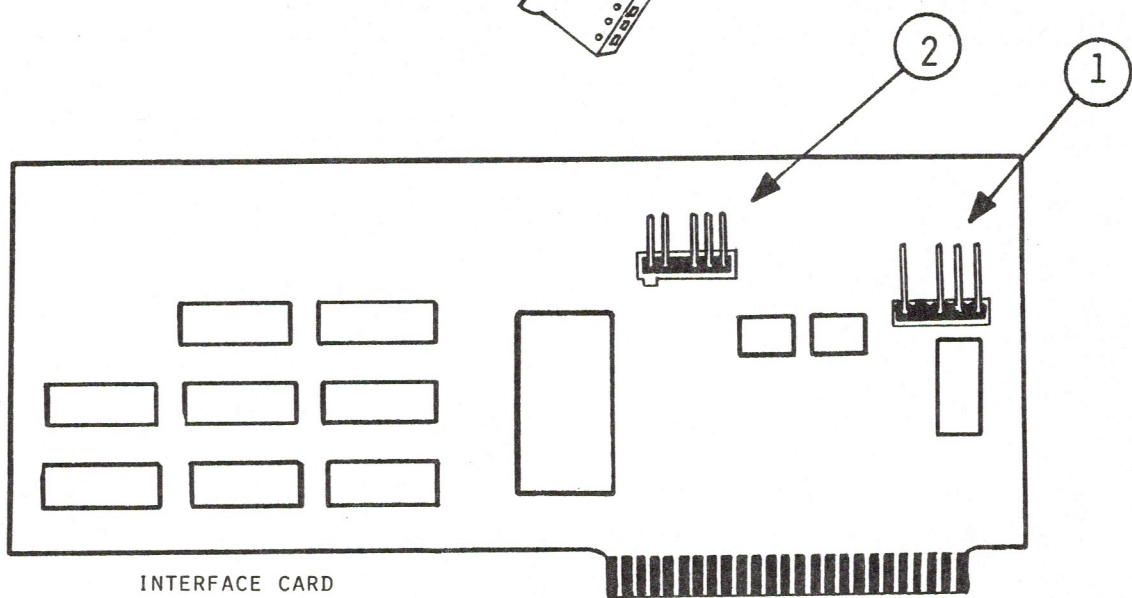


FIGURE 2

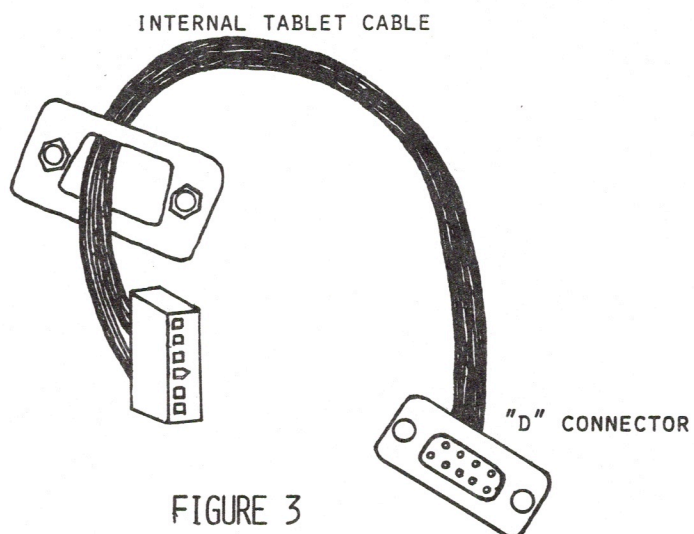


FIGURE 3

## **INTRODUCTION**

The new Graphics Tablet RFI is functionally identical to that of the NON-RFI Graphics Tablet, A2M0029. Minor changes have been made to meet EMI specifications required by the FCC.

## **EQUIPMENT REQUIRED**

To install the Graphics Tablet on an Apple IIe you will need:

- o Small flatblade screwdriver
- o Two nut plates
- o Four hexagonal-head screws
- o The small wrench that comes with the Graphics Tablet

NOTE: The large, gray-metal, two-piece connector clamp that comes with the interface card is not needed for Apple IIe installation. It is only used with earlier models of the Apple II.

### **A. CONNECTING THE INTERNAL CABLES TO THE INTERFACE CARD**

1. Find the internal pen cable and one of the nut plates (see Figure 1). This cable has a "D"-shaped connector at one end and a small slip-on connector at the other end with four holes in it. Put the slip-on connector through the nut plate, with the nuts facing away from the "D"-shaped connector.
2. Locate a set of four pins near the top right edge of the interface card (see Figure 2, #1) and slide the slip-on connector onto the pins.
3. Now find the internal tablet cable and put its slip-on connector through the nut plate, with the nuts facing away from the "D"-shaped connector (See Figure 3).
4. Slide this connector onto the second set of pins (see Figure 2, #2) on the interface card to the left of the first cable you connected.



## **B. INSERTING THE INTERFACE CARD**

1. Unplug the power cord from the back of the computer.
2. Remove the cover of the Apple computer. You will install the interface board into one of the expansion slots at the back of the main board. The slots are numbered from 1 to 7 with slot 1 nearest to the power supply case. The interface card will work properly in any slot except slot 3. Slot 5 is a good choice because it's near the location where the "D" connectors will be installed on the back of the computer.
3. Insert the interface card into slot 5.

## **C. ATTACHING THE CABLES TO THE BACK PANEL**

1. Now turn the computer around and look at the back panel. You'll see several numbered openings with rectangular plugs in them. Openings 5 and 6 will be used for the Graphics Tablet connectors (actually, any of the openings may be used as long as they are the same size). Remove the hole plugs in openings 5 and 6 by pressing down and out on the plastic tab on the back of each plug.
2. Slide the nut plate up the tablet internal cable until it's right up against the "D"-shaped connector. The tablet internal cable is the one connected closest to the middle of the interface card.
3. Next put the connector and nut plate up against the bottom opening in the back panel (opening 6). The connector should be in direct contact with the back panel, the nut plate should be directly behind the connector, and the part of the connector with the nine holes in it should be protruding through the opening.



4. Now insert the hexagonal-head screws from outside the computer through the notches above and below the opening in the back panel, then through the holes in the connector, and finally through the holes in the nut plate. Tighten the screws with the wrench that came in the Graphics Tablet package.
5. Plug the cable from the Graphics Tablet into the internal cable connector. Finish the connection by tightening the two screws.
6. Now attach the internal pen cable to opening 5 on the back panel.
7. Next plug the external pen cable into the internal pen connector. Tighten the two screws.
8. Double-check all of the connections you've made, using this list:
  - o the internal tablet cable is attached to the external tablet cable
  - o the internal pen cable is attached to the external pen cable
  - o the interface card is firmly seated
  - o the "D"-shaped connectors are firmly plugged in and the screws are tightened down
9. Put the cover back on the computer.



# Graphics Tablet Technical Procedures

## Section 2

### Apple II or Apple II-Plus Installation

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Connecting the Internal Cables to the Connector Card.....	2.5
Installing the Connector Clamp.....	2.6
Inserting the Interface Card.....	2.6
Connecting the Internal and External Cables.....	2.6



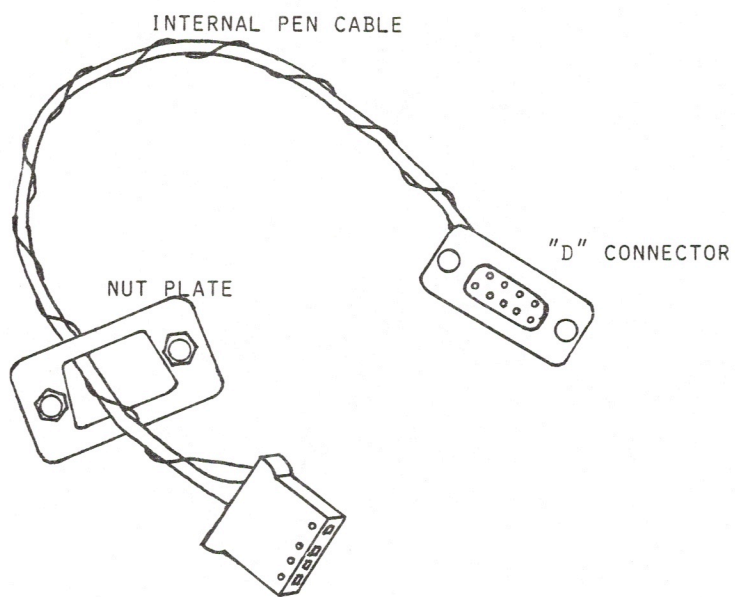


FIGURE 1

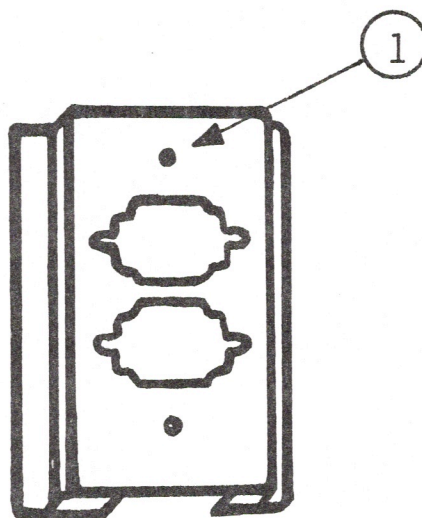


FIGURE 2

## INTRODUCTION

The new Graphics Tablet is functionally identical to the non-RFI Graphics Tablet, A2M0029. Minor changes have been made to meet the EMI specifications required by the FCC.

## EQUIPMENT REQUIRED

To install the Graphics Tablet on an Apple II or II Plus you'll need these items:

- o The large, gray-metal, two-piece clamp that comes with the Graphics Tablet
- o Two nut plates
- o Two Phillips-head screws
- o Four hexagonal-head screws
- o The small wrench that comes with the Graphics Tablet
- o Small Phillips screwdriver
- o Small flat blade screwdriver

### A. ATTACHING THE INTERNAL CABLES TO THE CONNECTOR CLAMP

1. Find the internal pen cable and one of the nut plates (See Figure 1). This cable has a "D"-shaped connector at one end and a small slip-on connector at the other end with four holes in it. Put the slip-on connector through the nut plate, with the nuts facing away from the "D"-shaped connector.
2. Find the front piece of the two-piece connector clamp (See Figure 2). The top is the end where the screw hole is nearer the edge (see Figure 2,#1). Put the "D"-shaped connector and nut plate right up against the top opening. The connector should be in direct contact with the clamp, the nut plate should be directly behind the connector, and the part of the connector with the nine small holes in it should be protruding through the opening in the clamp.
3. Attach the connector and the nut plate to the clamp by putting the hexagonal-head screws through the front of the clamp, then through the holes in the "D"-shaped connector, and finally through the nut plate. Tighten down the screws with the small wrench that came with the Graphics Tablet.

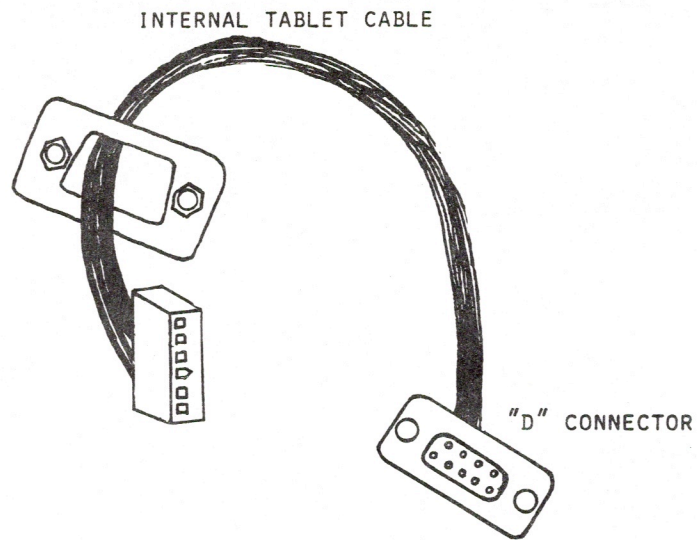


FIGURE 3

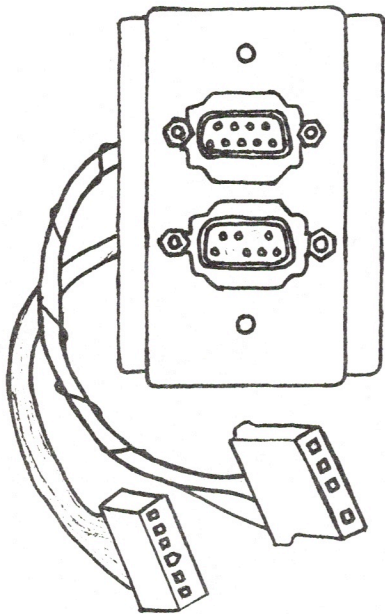


FIGURE 4

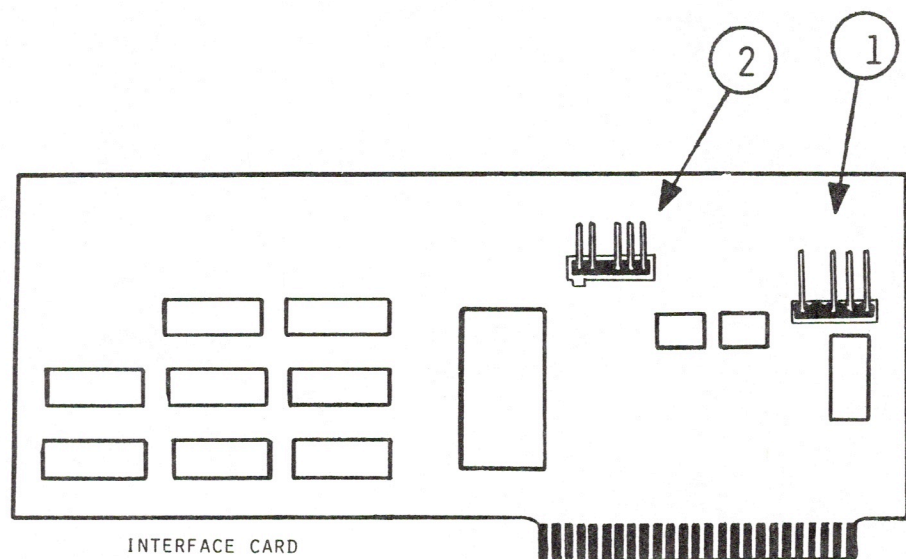


FIGURE 5



4. Now find the internal tablet cable (see Figure 3). It has a slip-on connector with six small holes on one end. Slide the slip-on connector through the other nut plate, making sure that the nuts are facing away from the "D"-shaped connector.
5. Attach the connector and nut plate, as you did in steps 2 and 3, to the bottom opening of the connector clamp. The assembled connectors are shown in Figure 4.
6. Now that the connectors are attached to the front of the clamp, fit the two clamp pieces together to form a "box" and put the two internal cables through the side opening on the back of the clamp. Make sure the screw holes line up. Attach the two clamp pieces with two Phillips head screws. Don't tighten the screws completely yet.

#### **B. CONNECTING THE INTERNAL CABLES TO THE INTERFACE CARD**

1. The internal pen cable should now be attached to the top cutout in the connector clamp. Check to see that the small slip-on connector at the end has four holes.
2. Locate a set of four pins near the top right edge of the interface card (see Figure 5, #1) and gently slide the slip-on connector onto the pins.
3. Now find the Graphics Tablet internal cable. It should be attached to the bottom cutout on the front of the connector clamp.
4. Slide the end with the slip-on connector onto the second set of pins (see Figure 5, #2) on the interface card to the left of the first cable you connected.

### **C. INSTALLING THE CONNECTOR CLAMP**

1. Unplug the power cord from the back of the computer and remove the cover.
2. Look at the back panel of the computer. The connector clamp will be installed into one of the three deep vertical notches. Take the connector clamp and slide it down as far as it will go into one of the notches. If you have trouble sliding the connector down into the notch, loosen the two Phillips head screws and then push it down into the slot. Now tighten the screws that hold the clamp assembly together until the clamp can no longer be moved in the opening.

### **D. INSERTING THE INTERFACE CARD**

1. You will install the interface card in one of the expansion slots. The slots are numbered from 0 to 7 with slot 0 nearest to the power supply. The interface card will work properly in any slot except slot 0. Insert the interface card into a slot near the connector clamp.

### **E. CONNECTING THE INTERNAL AND EXTERNAL CABLES**

1. Now find the cable attached to the Graphics Tablet pen and plug it into the top connector. Complete the connection by tightening the screws on the external pen connector.
2. Plug the connector on the cable attached to the Graphics Tablet into the bottom connector. Complete the connection by tightening the screws on the external tablet connector.
3. Double-check all of the connections you've made, using this list:
  - o the internal tablet cable is attached to the external tablet cable
  - o the internal pen cable is attached to the external pen cable
  - o the interface card is firmly seated
  - o the "D"-shaped connectors are firmly plugged in and the screws are tightened down
4. Put the cover back on the computer.

# Graphics Tablet Technical Procedures

## Section 3

### Troubleshooting

#### Contents:

Symptom Table.....	3.3
Pen Alignment.....	3.4
Checking the Table.....	3.5





## SYMPTOM TABLE

**CAUTION:** Diskettes and video tapes can be erased by the magnetism of the Graphics Tablet or biasing magnet. Do not store diskettes or video cassettes on or near the Graphics Tablet or biasing magnet.

SYMPTOM	CORRECTIVE ACTION
MONITOR DISPLAYS: "NOT DETECTING INTERFACE CARD"	1. Check interface card firmly seated 2. Clean card contacts ("fingers") 3. Replace interface card.
UNABLE TO DRAW OR SELECT MENU COMMANDS WITH THE PEN	1. Swap the following components in this order: o Interface card o Pen o Internal pen cable o Internal tablet cable o Graphics tablet
APPLE IIe "BEEPS" WHEN TYPING GRAPHICS TABLET COMMANDS	1. Press the "CAPS LOCK" key and retype the command. Apple IIe will not accept lower case commands with the Graphics Tablet software.
ERRATIC DRAWING: EXTRA OR MISSING DOTS	1. Wipe the tablet surface and the menu with the anti-static cloth

**CAUTION:** When using the biasing magnet, keep the magnet away from diskettes and video tapes. A magnetic field can erase information.

2. With power off, draw the biasing magnet across the surface using a slow continuous motion in a single direction. Do this for each direction; left to right, top to bottom, and diagonally.
3. Boot the Graphics Tablet Software diskette.
4. Select MENU ALIGNMENT and follow the instructions on the monitor.

**NOTE:** If the tablet does not pass the MENU ALIGNMENT procedure, perform the following procedure, PEN ALIGNMENT.

## PEN ALIGNMENT

To perform this procedure, you will need the following:

- o Apple II Products Diagnostic Diskette (P/N 077-0100)
- o Pen alignment block
- o Nylon coil adjustment tool
- o Sheet of 1/8" plexiglass
- o Anti-static cloth

1. Boot the Apple II Products Diagnostic diskette.
2. Select CARD TESTS and after that GRAPHICS TABLET TEST.

**NOTE:** To avoid confusion follow the instructions given here rather than the instructions displayed on the screen, as they sometimes refer to things you should do after you have pressed <ESC> to proceed to the next screen.

3. Press <ESC> and wait for the ROM test. If the ROM test fails, replace the interface card.
4. Press <ESC>.
5. Place the pen in the wooden alignment block.
6. Place the alignment block so that the pen is between the eighth and ninth lines (counting the top border of the graph as line 1) in the column called "dots".
7. Press <ESC> twice.
8. Insert the nylon coil adjustment tool into the top of L2 (upper left corner of the interface card), and turn the slug counterclockwise until it is even with the top of the sleeve; then turn it clockwise until the crosshairs stabilize in the middle box. Continue to turn until they disappear again.
9. Now turn it counterclockwise again until the crosshairs first stabilize within the middle box.
10. Look straight down on the top of the tool and notice what direction the blade is pointing in.
11. Now continue to turn the tool counterclockwise.
12. When the crosshairs lose stability and jump out of the box, restabilize them; then look at the top of the tool and note which direction the blade points.
13. The correct setting is halfway between the two points at which the crosshairs stabilize.



## CHECKING THE TABLET

With the surface biased, the menu aligned, and the pen aligned, you must check the tablet to see if there are any troubles that have not been corrected.

1. Press <ESC> three times.
2. Wipe both sides of the sheet of 1/8" plexiglass with the anti-static cloth.
3. Place the plexiglass over the menu and with a straight edge (don't use metal), draw lines around the edges, through the middle, and diagonally. There should be no gaps, double lines, "glitches", or extraneous dots. If there are, repair the biasing procedures, and wipe the surfaces with the anti-static cloth.
4. If there are still missing or extra dots, the unit should be sent to Level II Service Center.



# Graphics Tablet Technical Procedures

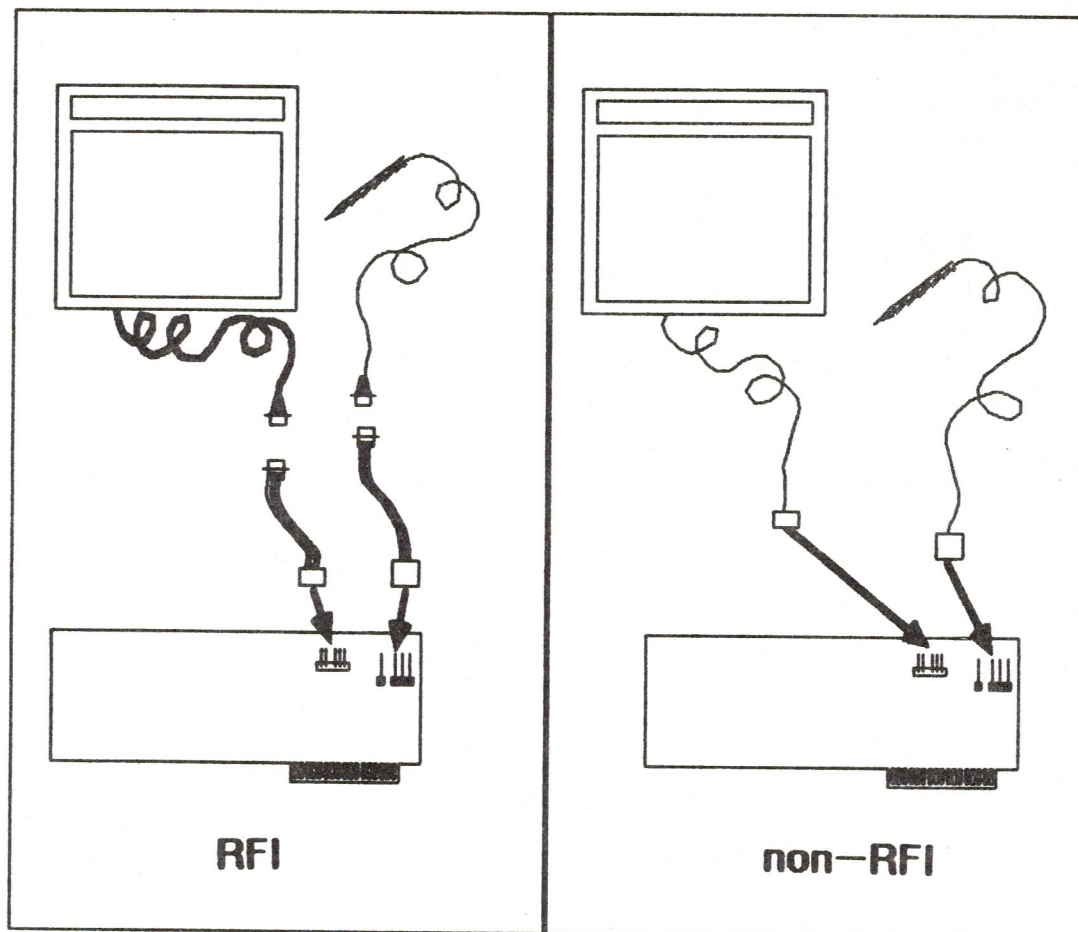
## Section 4

### RFI Upgrade Procedures

#### Contents:

Introduction.....	4.3
RFI Parts and Part Numbers Needed for the Upgrade.....	4.3
Upgrading to RFI.....	4.5





**Figure 1**

## INTRODUCTION

When a non-RFI Graphics Tablet is brought in for repair, you can either service it using the non-RFI parts that you have in stock or replace non-RFI modules/parts with their RFI counterparts. This section tells you what parts you will need and what to do to upgrade from a non-RFI Graphics Tablet to an RFI version.

## RFI PARTS AND PART NUMBERS NEEDED FOR THE UPGRADE

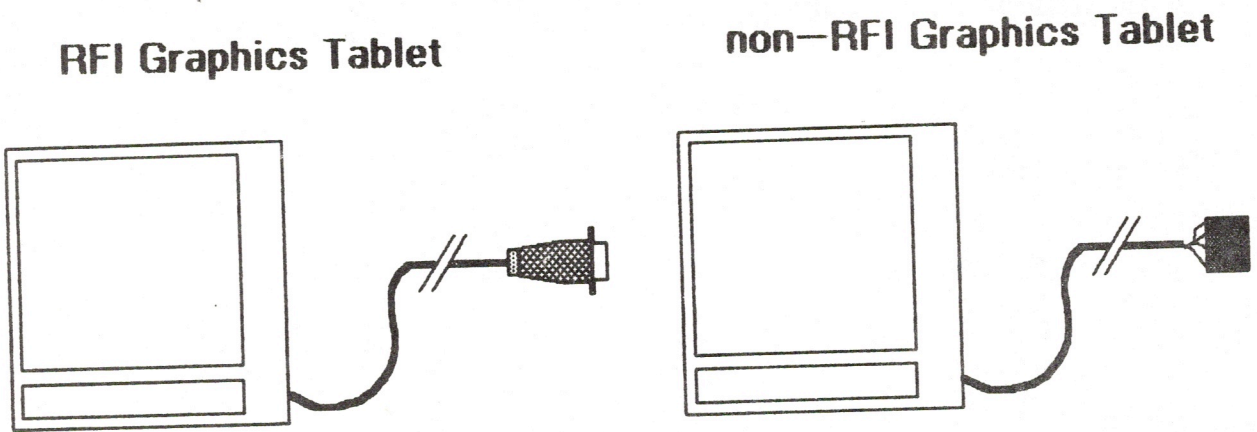
You will need the following RFI parts to do the upgrade:

661-91140	Graphics Tablet Assy-RFI
661-91141	Graphics Tablet Interface Card-RFI
661-91142	Graphics Tablet Stylus RFI
590-0085	Cable Assy Tablet, Internal
590-0102	Cable Assy Stylus, Internal
600-8010	Assy, Installation Hardware (A IIe)
805-0085	Clamp, Rear Peripheral Int. Conn. (A II/II+)
805-0105	Clamp, Front (A II/II+)

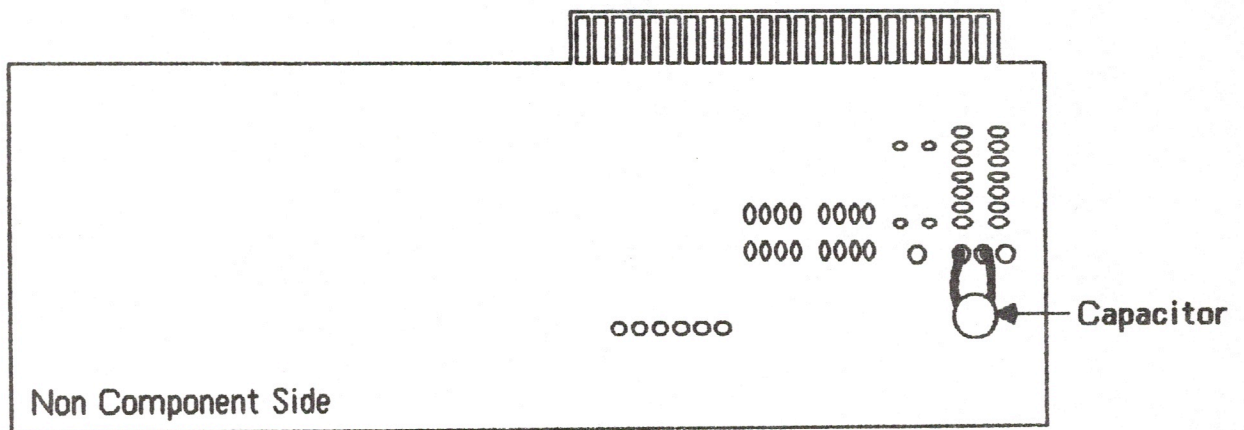
## UPGRADING TO RFI

Refer to Figure 1, which shows the configuration for the RFI and non-RFI versions of the Graphics Tablet. Notice that the only difference for the RFI configuration is that the tablet and the pen do not connect directly to the Interface Card. Instead, they connect to a short cable, and the cable connects to the Interface Card.

**NOTE:** Graphics Tablet installation procedures for the Apple IIe are given in **Section 1**, of the **Graphics Tablet Technical Procedures**. **Section 2** gives the installation procedures for the Apple II and II Plus.



**Figure 2**



**Figure 3**



To upgrade to RFI, follow these steps:

1. Connect the RFI Graphics Tablet (see Figure 2) to the short cable with the colored plastic connector. Connect the other end of the short cable to the five-pronged connector on the RFI Interface Card. (See Figure 1.)

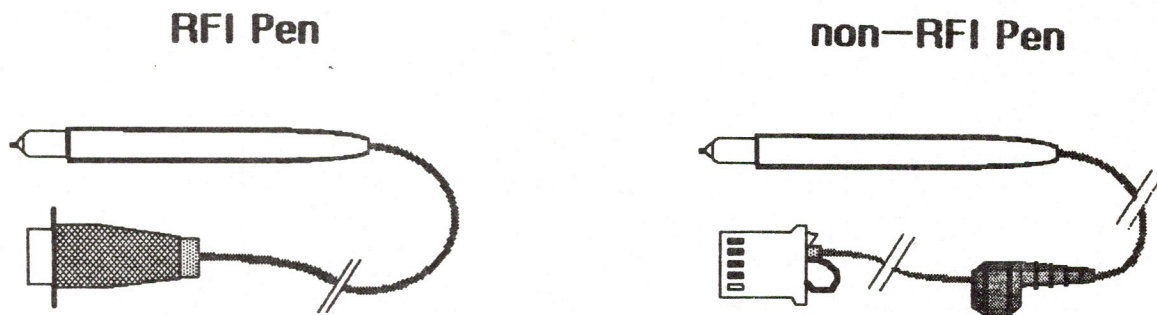
**NOTE:** The RFI Interface Card has a different R1 resistor value than the non-RFI version.

RFI            R1 = 75 Ohm-5% (purple-green-black-gold)

Non-RFI      R1 = 470 Ohm-5% (Yellow-purple-brown-gold)

The RFI version also has a capacitor on the noncomponent side of the card. (See Figure 3.)

2. Connect the RFI Pen (see Figure 4) to the short cable with the white plastic connector. Connect the other end of the short cable to the four-pronged connector on the RFI Interface Card. (See Figure 1.)
3. If there is a non-RFI Interface Card in the computer, remove it and then insert the RFI Interface Card into slot 4 of the computer.



**Figure 4**



# Graphics Tablet Non RFI-RFI Technical Procedures

## Section 5

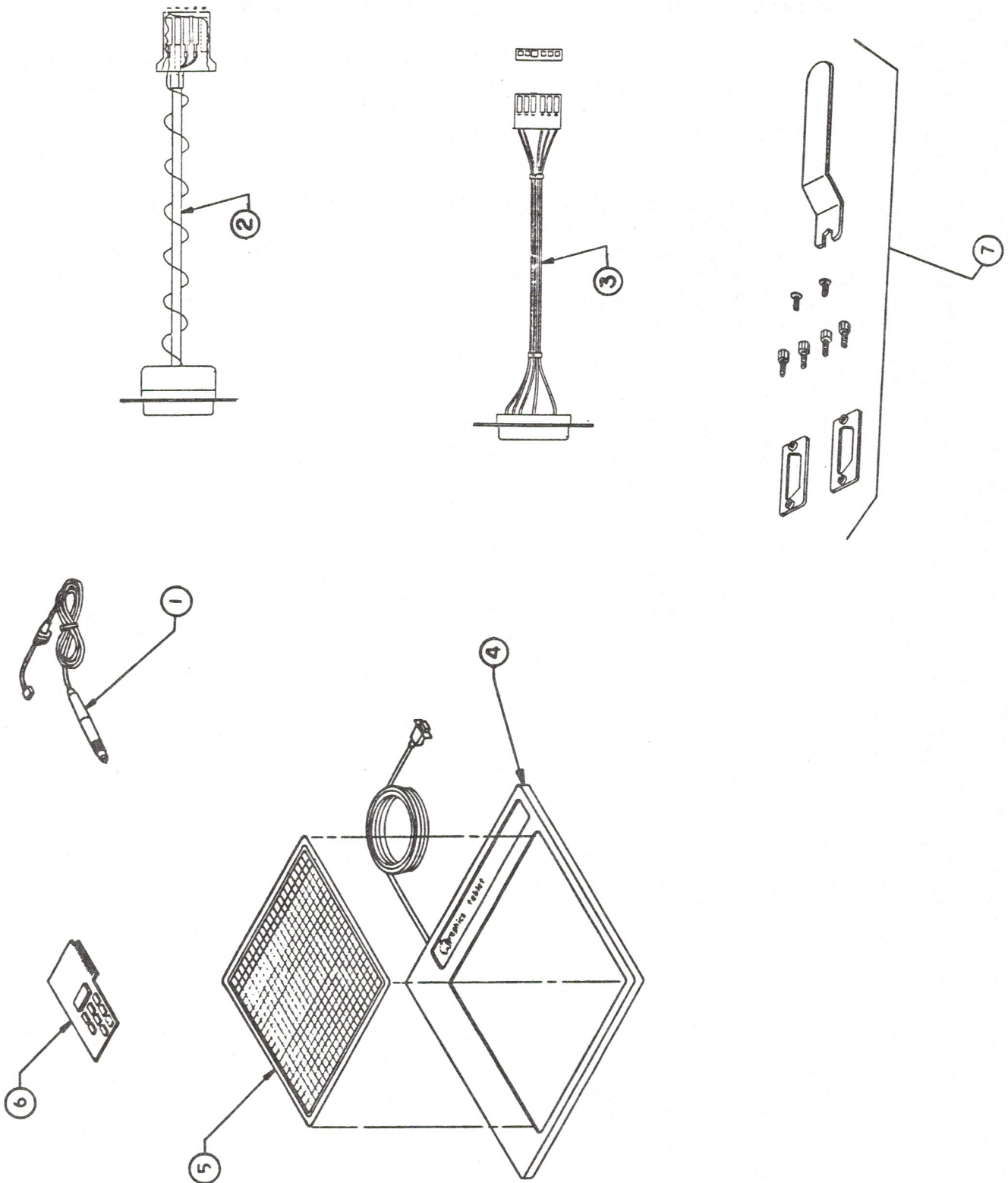
### Illustrated Parts List

The figures and lists below include all piece parts that can be purchased separately from Apple for the Graphics Tablet Non RFI-RFI, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### Contents:

Illustrated Parts List.....5.1





# GRAPHICS TABLET, NON RFI-RFI

Item	Part No.	Description
1	661-91142	Graphics Tablet Stylus RFI
2	590-0102	Cable Assy Stylus, Internal
3	590-0085	Cable Assy Tablet, Internal
4	661-91140	Graphics Tablet Assy-RFI
5	825-0039	Overlay Apple Graphics Tablet
6	661-91141	Graphics Tablet Interface Card-RFI
7	600-8010	Assy, Installation Hardware (A IIe)
8	805-0085	Clamp, Rear Peripheral Int. Conn. (AII, AII+)
9	805-0105	Clamp, Front (AII, AII+)

**End of Graphics Tablet  
Section Start of Numeric  
Keypad Section**



## NUMERIC KEYPAD TECHNICAL PROCEDURES

### TABLE OF CONTENTS

#### Section 1 - Troubleshooting & Assembly/Disassembly

A. Troubleshooting Guide.....	1.3
B. Assembly/Disassembly	
Disconnecting Keypad.....	1.5
Swapping the Cable & Keypad Assembly.....	1.5
Reconnecting Keypad.....	1.9

#### Section 2 - Illustrated Parts

Illustrated Parts List and Diagrams.....	2.3
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#### Appendix A.

Numeric Keypad keyswitch identification.....	A.1
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# **Numeric Keypad Technical Procedures**

## **Section 1**

### **Troubleshooting Assembly/Disassembly**

#### **Contents:**

A. Troubleshooting Guide.....	1.3
B. Assembly/Disassembly	
Disconnecting Keypad.....	1.5
Swapping the Cable & Keypad Assembly.....	1.5
Reconnecting Keypad.....	1.9



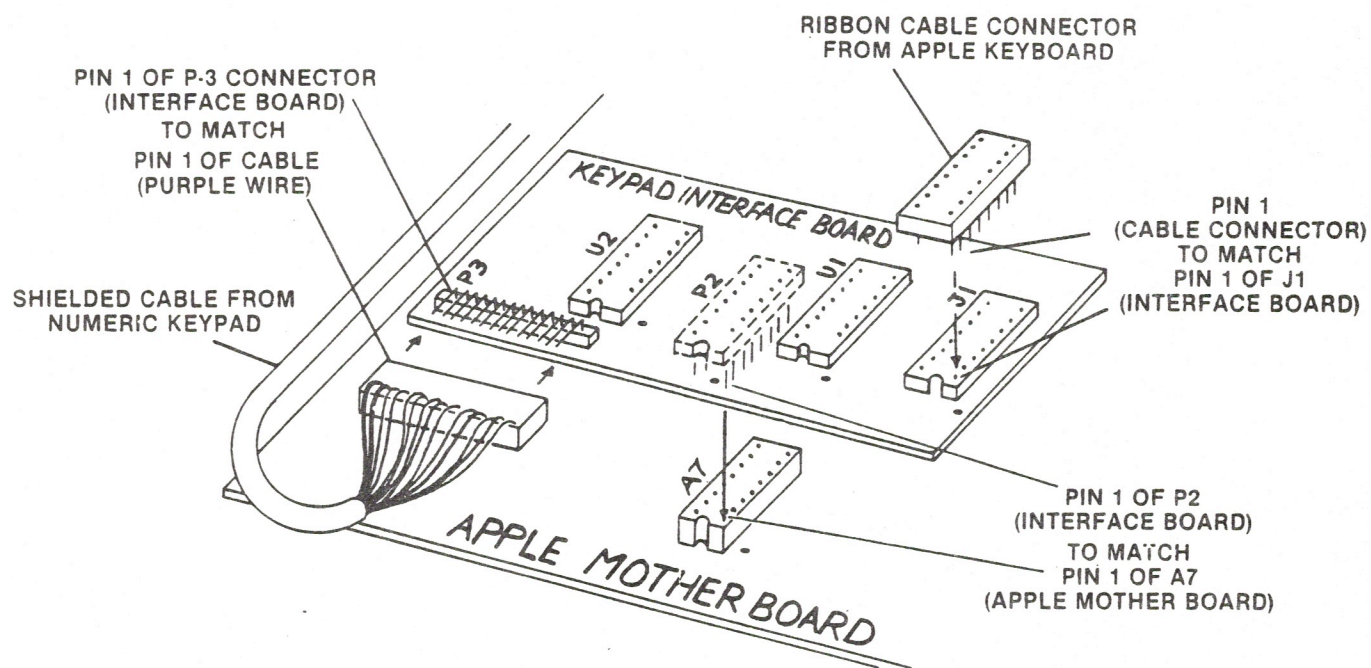


FIGURE A

## A. TROUBLESHOOTING GUIDE FOR THE NUMERIC KEYPAD

**NOTE:** The special function keys (arrows, return, etc.) on the Numeric Keypad do not work properly when used with an Apple IIe containing a "revision C" character generator ROM. The Revision C ROM (part number 342-0132-C) was first shipped in the Apple IIe after 8/25/84. If you encounter difficulties with the function keys on the Keypad, check to see if the Apple IIe logic board contains the "revision C" ROM at location E-12. If it does **REPLACE THE CHARACTER GENERATOR ROM** with any other version from service stock (for example; part numbers 342-0132-A or 342-0132-B). **DO NOT REPLACE THE ENTIRE APPLE IIe LOGIC BOARD.**

1. Confirm that the keypad is malfunctioning by running keyboard test of Dealer Diagnostic diskette.

When you have isolated the malfunction to the Numeric Keypad, determine the failed component by performing the following steps:

2. Complete steps 1a. through 1i. of ASSEMBLY/DISASSEMBLY INSTRUCTIONS (on following pages) to gain access to and remove the keypad interface board.
3. Swap the interface board with a known good unit (from spares kit), reconnecting pins and cables as shown in Figure A.
4. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, put the old interface board back in and go to the next step.
5. Swap the cable, following steps 1j and 2 to 12 of the Assembly/Disassembly instructions. (see reminder below)
6. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble the Apple II. If the pad doesn't work, remove the new cable and use the old cable in the next step.
7. Swap the keypad assembly following steps 7 to 12 of the Assembly/Disassembly instructions. (see reminder below)
8. Test the keypad using the Dealer Diagnostic diskette keyboard test. If the pad now works, reassemble it and the Apple II (steps 13 to 15 of the Assembly/Disassembly instructions). The pad **SHOULD** work. If it doesn't, you have defective exchange modules. Find new exchange modules and start from step 3 above.

**REMINDER:** Before swapping ANY unit on the Numeric Keypad, **POWER DOWN THE SYSTEM AND REMOVE THE POWER CORD FROM THE APPLE.**



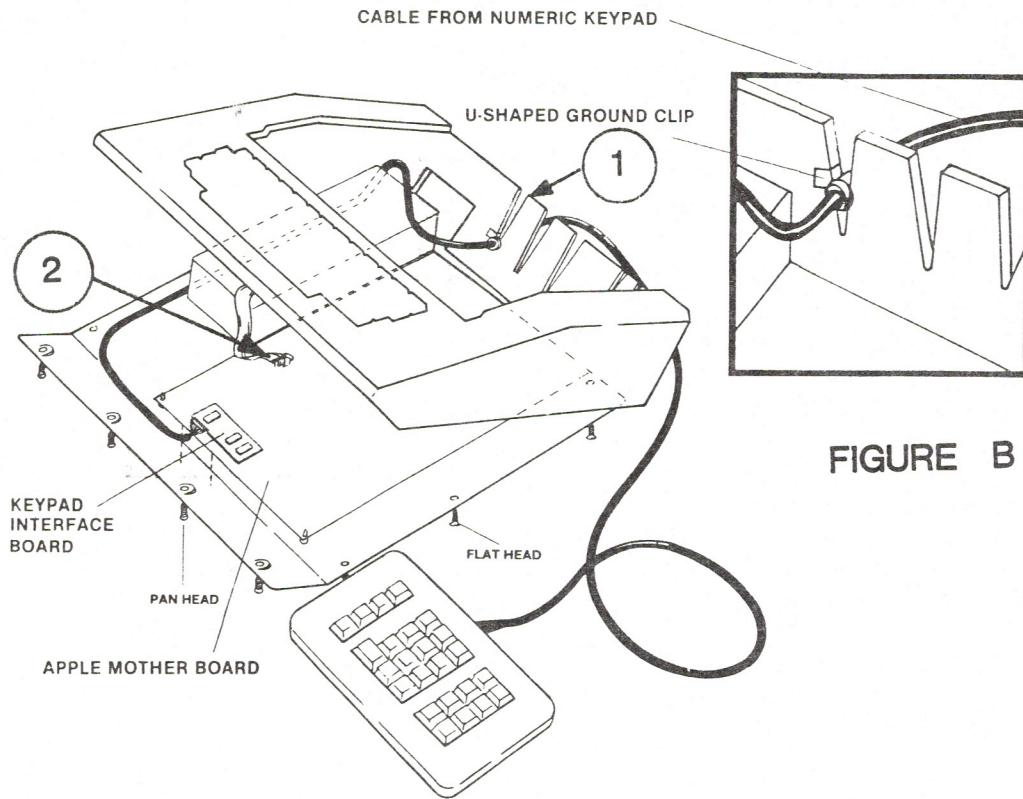
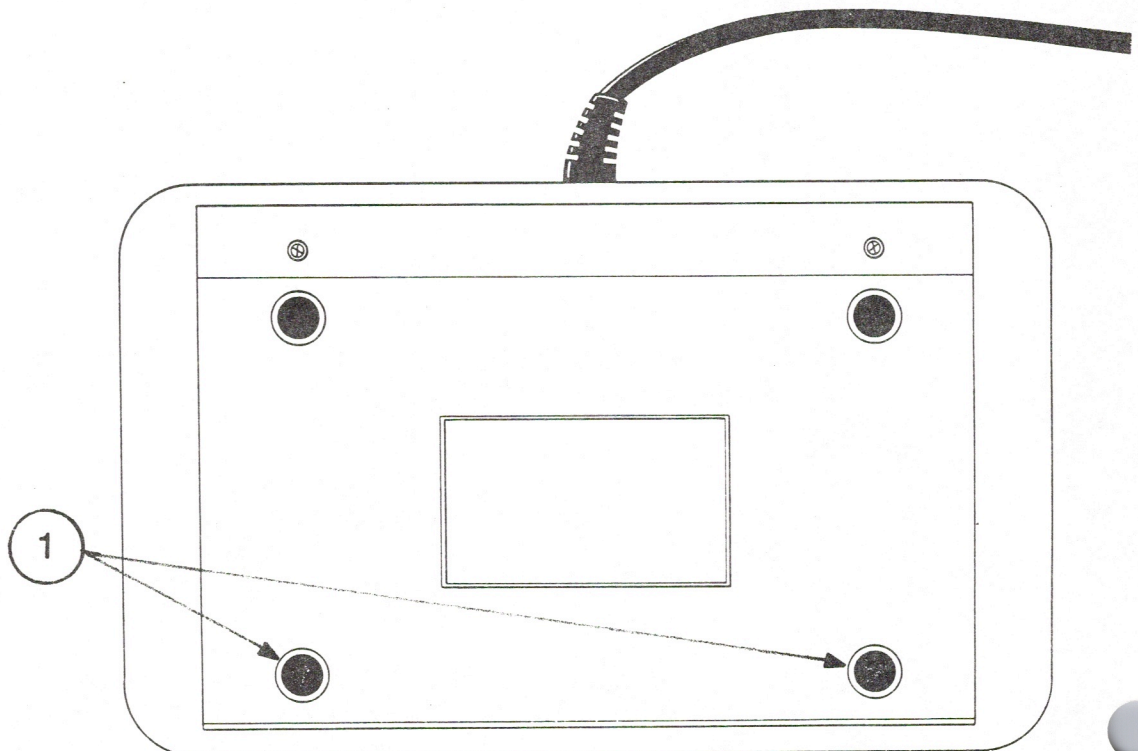


FIGURE C





## **B. ASSEMBLY/DISASSEMBLY INSTRUCTIONS FOR THE NUMERIC KEYPAD**

Items needed:

Dealer Diagnostic diskette  
Medium Phillips screwdriver  
Soldering iron, solder, solder wick  
Replacement modules (interface card, cable, keypad assembly)  
Foam pad

### **DISCONNECTING KEYPAD FROM APPLE**

1. Complete these steps to disconnect the Numeric Keypad from the Apple.
  - a. Power off the system and remove power cord -- first from the wall source and then from the rear of the Apple Housing.
  - b. Remove Apple lid. Except for keypad cable, disconnect all other external cables connected to the Apple.
  - c. Turn Apple upside down so keyboard rests on protective foam pad.
  - d. Remove six flat-head screws from three outside edges of flat portion of Apple base.
  - e. Remove four pan-head screws and lock washers from front of base.
  - f. Holding both base and housing, turn Apple right side up. (On newer Apple II's, it may be necessary to additionally remove four round head-screws and lock washers along the rear of the Apple that fasten the mother board to the base.)
  - g. Gently lift the front of the housing slightly off the base and unplug keyboard connector (see Figure B, #2) from keypad interface board.
  - h. Grasp keypad interface board firmly and gently lift from motherboard.
  - i. Lift housing off base and set aside (careful - keypad cable still attached)

Do NOT proceed to next step unless you are swapping the cable or keypad assembly. Return to #3 of Troubleshooting Guide.

- j. Unthread cable through notch in rear of Apple. (see Figure B, #1)

### **SWAPPING THE CABLE & KEYPAD ASSEMBLY**

2. Remove the 2 exposed Phillips screws on bottom of keypad case.
3. Remove the 2 LOWER rubber feet. They just pry off. (See Figure C, #1)

**CONTINUE on page following illustrations.**

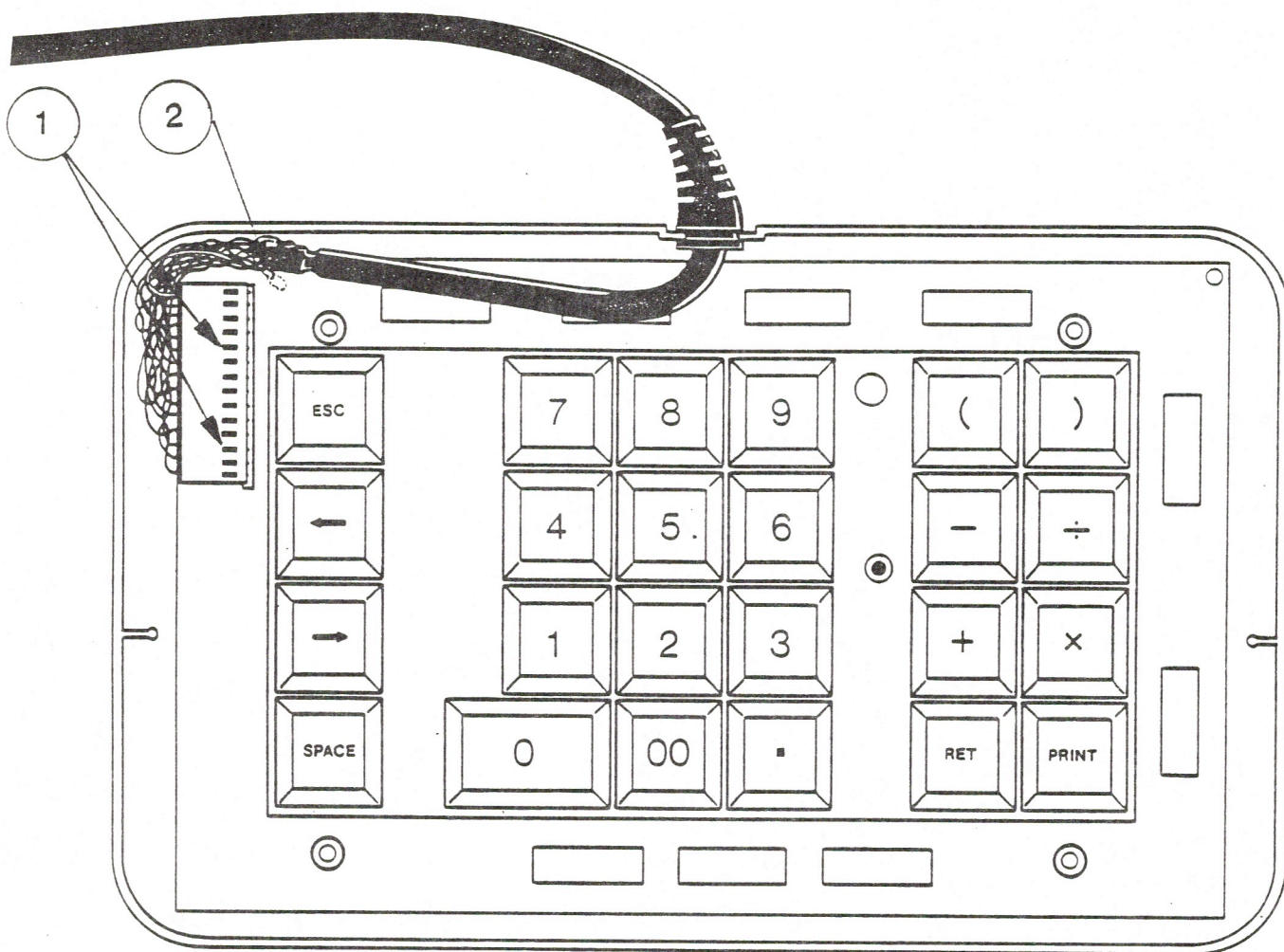


FIGURE D



4. Remove the 2 screws that are under the rubber feet you just removed.
5. Holding the case top to the bottom, turn the pad back over.
6. Remove case top by lifting off.
7. If you are replacing the CABLE ONLY, skip this step. Get the exchange keypad assembly from spares kit and set it next to the customer's keypad assembly. Pry off the key caps ONE AT A TIME, placing the cap from the customer's pad on to the new pad at the same location.
8. Note how the cable is laid and how it exits the case as shown in Figure D. Lift out customer's pad and place on normal soldering surface. (This step might not be applicable in swapping the keypad assembly.)
9. Carefully unplug the cable connector noting that the grooves of the cable connector are face up (see Figure D, #1).
10. Use a soldering iron to unsolder the grounding wire that is attached to the upper left side of the pad (see Figure D, #2)..
11. Get the appropriate cable (new one if you are replacing the cable, old one if this is a keypad swap) and plug it into the appropriate keypad assembly (old pad if this is a "cable only" swap, new pad if you are replacing the customer's pad). Note that the grooves of the cable connector are face up (see Figure D, #1).
12. Solder the ground wire to the designated area at the upper left side of the pad (see Figure D, #2).

STOP HERE! If you are CABLE SWAPPING, return to step 6 of the Troubleshooting Guide. If you are SWAPPING THE KEYPAD ASSEMBLY, return to step 8 of the Troubleshooting Guide. Do NOT reassemble keypad at this point.

13. When reassembling keypad, be sure the cable is laid correctly in the case bottom and that it points down as it exits the case as shown in Figure D. Be careful that all wires are set INSIDE the bottom of the case so none get pinched when the top is secured in place.
14. Replace case top. Turn pad over and replace 4 screws and LOWER rubber feet.

**CONTINUE on page following illustrations.**



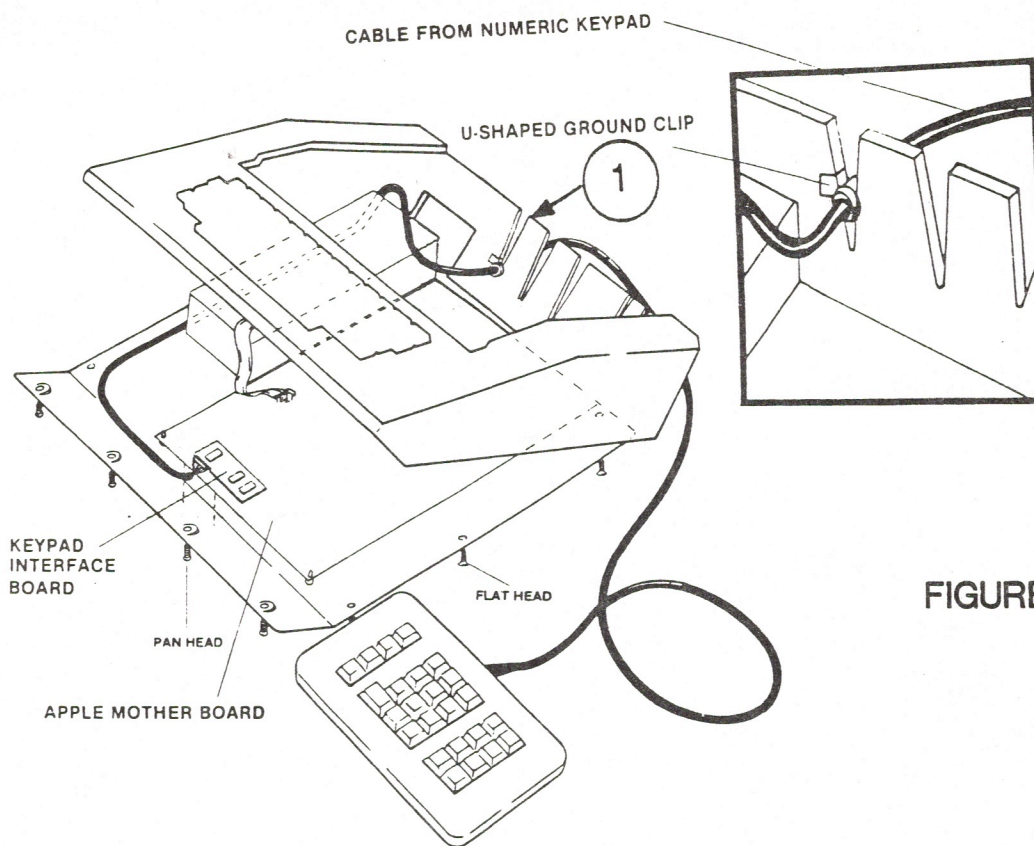


FIGURE E

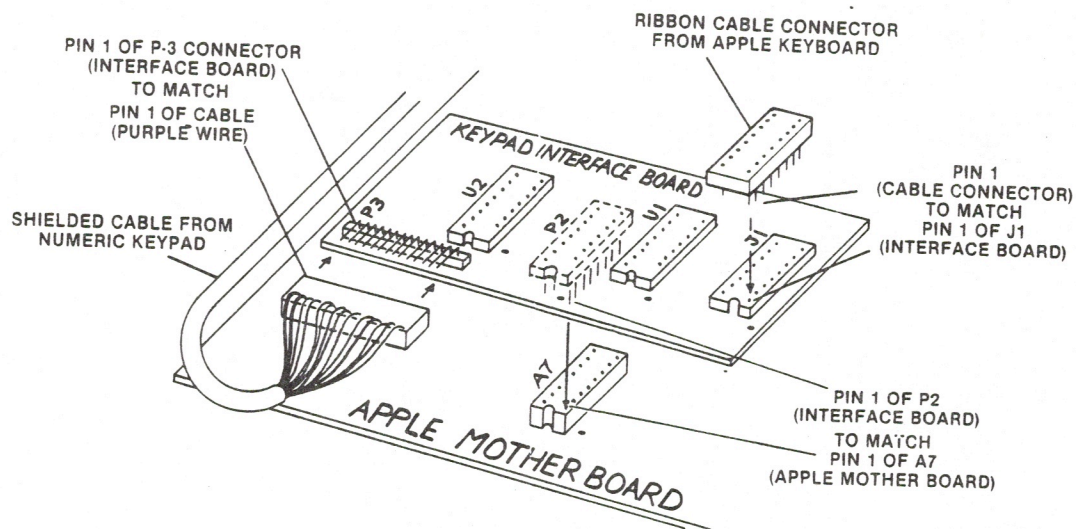


FIGURE F

## RECONNECTING KEYPAD TO APPLE

15. Complete these steps to reconnect Numeric Keypad to Apple.
  - a. Set housing back on Apple base (do NOT set screws in place yet!)
  - b. Thread the cable through a notch in the rear of your Apple.
  - c. Slide the little u-shaped ground clip on the cable down the edge of the notch to secure the ground to the Apple case. (see Figure E, #1)
  - d. Plug interface board connector P2 into mother board socket at A7. Be sure to match up P2 pin 1 to A7 pin 1. Plug keyboard connector into keypad interface board connector J1. Be sure to match up pin 1 - J1 to pin 1 keyboard connector. (see Figure F)
  - e. Holding both base and housing, turn Apple upside down so keyboard rests on foam pad.
  - f. Install four lock washers and pan-head screws at front of base.
  - g. Install six flat-head screws at three outside edges of Apple base.
  - h. Turn Apple right side up, reinstall lid, and reconnect other cable connected items and the power cord to Apple.





## **Numeric Keypad Technical Procedures**

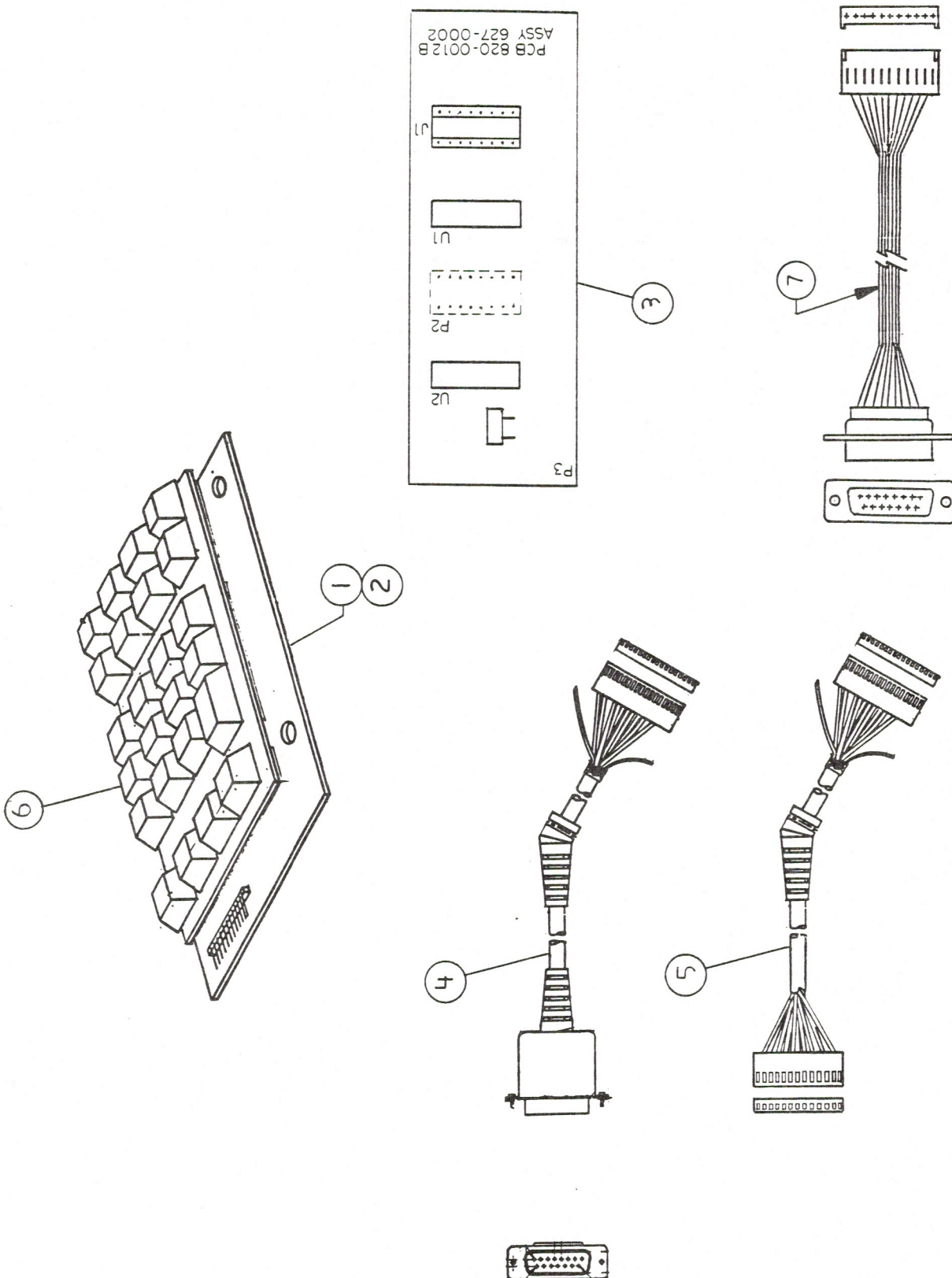
### **Section 2**

#### **Numeric Keypad Apple II/IIf Illustrated Parts List**

The figures and lists below include all piece parts that can be purchased separately from Apple for the Numeric Keypad, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

#### **Contents:**

Numeric Keypad Apple II/IIf.....2.2



## NUMERIC KEYPAD APPLE II/IIf

Item	Part No.	Description
1	661-0314	Numeric Keypad Assembly, II, with cable
2	658-4040	Numeric Keypad Assembly, IIf
3	658-0005	Assy, PCB, Interface Keypad II
4	590-0130	Cable, Numeric Keypad IIf
5	590-0119	Cable, Numeric Keypad II
6	658-7008	Keycap Set, Numeric Keypad II
	658-7044	Keycap Set, Numeric Keypad IIf
7	590-0129	Interconnect Cable, Numeric Keypad IIf

The following keyswitches are illustrated in **Appendix A:**

705-0070	Alps Long Stem Keyswitch
705-0075	SMK Keyswitch Short Stem

The parts list for the Macintosh Numeric Keypad can be found in the **Macintosh Technical Procedures, Section 5, Illustrated Parts List.**





## Numeric Keypad Technical Procedures





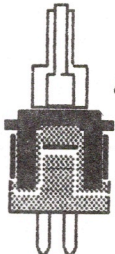
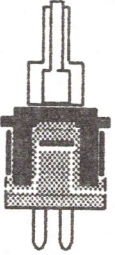
### Appendix A

#### Keyboard and Keyswitch Identification

Apple Computer makes three types of numeric keypads, one each for the Apple II, IIe, and Macintosh. To identify the keyswitches used with these keypads, refer to Figure 1 below.

Some of the keyswitches are used on more than one numeric keypad: For example Alps long stem is used on both the Apple IIe and Macintosh Numeric Keyboards.

The procedure to replace a keyswitch is in **Section 3 of You Oughta Know....** For information about Macintosh Numeric Keyboards, go to the Macintosh section of the Technical Procedures Binder.

FIGURE 1:      Keyswitch		Keyboards
A. Apple II Numeric Keypad		Apple II Keypad
	(Obsolete)	Service Number:
	705-0075 SMK Short Stem Keyswitch	661-95092
B. Apple IIe Numeric Keypad		Apple IIe Keypad
	(Obsolete)	Service Number:
	705-0075 SMK Short Stem Keyswitch	658-4040
	705-0070 Alps Long Stem ("Extended")	
C. Macintosh Numeric Keypad		Macintosh Keypad
	705-0070 Alps Long Stem ("Extended")	Service Number: 658-4045

**End of Numeric Keypad  
Section Start of  
Miscellaneous Illustrated  
Parts Section**



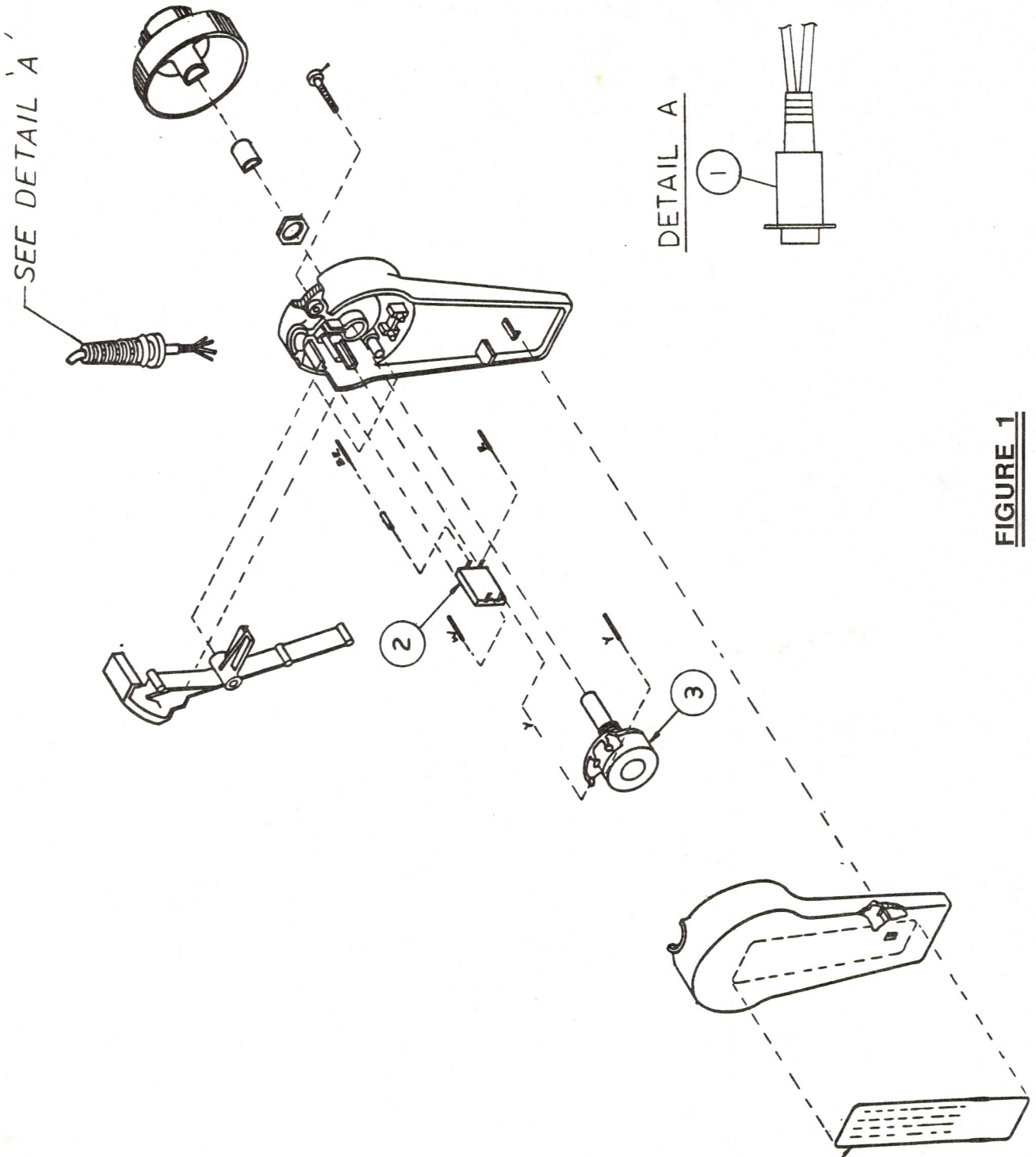
## MISCELLANEOUS ILLUSTRATED PARTS

### TABLE OF CONTENTS

The figures and lists which follow include some miscellaneous piece parts that can be purchased separately from Apple, along with their part numbers. Refer to your Apple Service Programs manual for prices.

#### Contents:

Hand Controller.....	1.2
Joystick Assembly.....	1.4

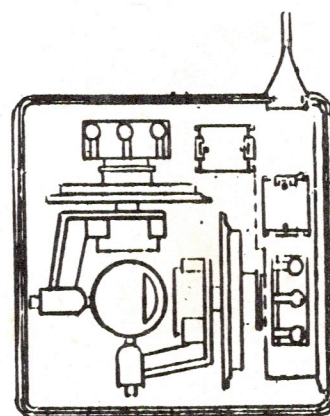
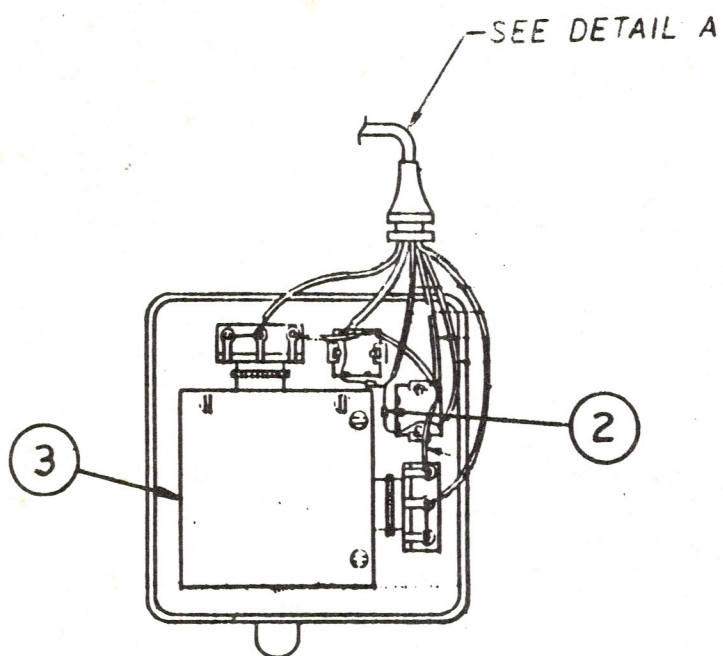


**FIGURE 1**

**HAND CONTROLLER - (Figure 1)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	590-0132	Cable, Hand Controllers, I1e
2	705-0072	Hand Controller, Pushbutton Switch
3	109-0430	Hand Controller, Potentiometer





DETAIL A

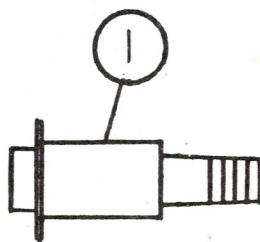


FIGURE 2